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SILAGE AS A PART RATION FOR HORSES AND
MULES OF VARIOUS AGES UNDER
VARYING CONDITIONS

by

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TABLE OF CONTENTS

Introduction	1
Literature	5
Experiment	24
Object	24
Plan	24
Animals Used	26
Rations Used	29
Plan and Method of Feeding	29
Weights	30
Feeds	31
Time	31
Exercise	32
Water	32
Record	32
Daily Program	33
The 1914-1915 Test	34
Chemists' Data	34
Description of Horses in the 1914-1915 Test	40
Management during the summer and fall previous to the beginning of the test	40
Feed Received	41
Digestible Nutrients received	42
Tables, Discussions and Photographs of Horses in the 1914-1915 test	43

Summary of total feed consumed during the 1914-1915 test	79
Summary of average feed consumed during the 1914-1915 test	80
Summary of total digestible nutrients consumed during the 1914-1915 test	82
Summary of average daily digestible nutrients consumed during the 1914-1915 test	83
Summary of digestible nutrients consumed per thousand pounds live weight during the 1914-1915 test	85
Summary of average daily digestible nutrients consumed per thousand pounds live weight during the 1914-1915 test	86
The 1915-1916 Test	88
Introduction	88
Chemists' Data	89
Description of Horses in the 1915-1916 Test	94
Management during the summer and fall previous to the beginning of the test	95
Feed Received	95
Digestible Nutrients Received	96
Tables, Discussions and Photographs of Horses in the 1915-1916 Test	97
Summary of total feed consumed during the 1915-1916 test	144
Summary of average feed consumed per day during the 1915-1916 test	145

Summary of total digestible nutrients consumed during the 1915-1916 test	147
Summary of average digestible nutrients consumed during the 1915-1916 test	148
Summary of total digestible nutrients consumed per thousand pounds live weight during the 1915-1916 test	150
Summary of average daily digestible nutrients consumed per thousand pounds live weight during the 1915-1916 test	151
Summary of the 1914-1915 and the 1915-1916 tests	153
Summary	167
Conclusion	174
Suggestions for future investigations	175

INTRODUCTION

There were 21,166,000 horses and 4,565,000 mules in the United States on January 1, 1916. The average value of horses was \$101.60 per head, making an aggregate value of \$2,150,468,000.00 and the average value of mules was \$113.87, making an aggregate value of \$519,824,000.00.

On January 1, 1911 there were 20,277,000 horses valued at \$111.45 per head, making an aggregate value of \$2,259,981,000.00 and at the same time there were 4,323,000 mules valued at \$125.92 making a total valuation of \$544,359,000.00.

During the five period the estimated number of horses has increased 889,000 head but they have decreased in value \$9.86 per head. Their aggregate value has decreased \$109,513,000.00.

The estimated number of mules has increased 342,000 during the same period, but they have decreased in value \$12.05 per head. Their aggregate value has decreased \$24,535,000.00.¹

The economic factors that have brought about these decreases in value per head of horses and mules are not quite clear. Motor power has supplanted horse power in some cases and this has caused a decreased demand for some types of horses.

The increased cost of feed caused by the high price of land and labor and other economic factors, with an average

¹Monthly Crop Report, January 31, 1916.

decreased value per head of horses and mules during the past five years makes it necessary that the cost of production and maintenance of horses be cheapened wherever possible. The increased number of silos and a better knowledge of their uses is providing farmers with an excellent cheap feed in the form of corn silage. If this valuable roughage can be fed to horses with success its use will become a factor in cheapening the production and maintenance of horses and mules.

Evidence secured by the Department of Animal Husbandry by correspondence and from the agricultural press indicates that numerous farmers and breeders have for many years successfully fed corn silage as a part ration to horses and mules. These men have shown great care in their feeding operations.

They have fed silage to horses and mules of all ages, including growing horses, brood mares, and working horses, with a view to cheapening the cost of growth and maintenance during the winter months.

The men who have been successful in feeding this roughage have been very careful to feed silage of good quality made from comparatively mature corn. It has been fed in varying amounts of from five to thirty pounds per head daily, the amount consumed depending somewhat on the size of the horses, the amount and kind of work performed, the quantity of grain and hay fed and upon the individuality of the horse.

The agricultural press¹ prior to 1912 cautioned

¹Breeders Gazette, March 23, 1904 p. 568
 " " June 26, 1907 p. 1414
 " " March 14, 1911 p. 560
 " " " 15, 1911 p. 702

against the use of silage, a few horses had died because of eating moldy, frozen or rotten silage. Since that time the press has taken a more liberal view of the situation and in most cases has recommended its use in limited quantities, cautioning against the feeding of moldy, frozen or rotten silage, or silage made from immature corn.

Very little experimental work has been done to determine the best methods of feeding silage either as concerns the quantity to feed or the most desirable combinations with other feeds. Several experiment stations have fed it in a limited way to horses and mules of different ages under varying conditions.

An experiment was started at the Missouri Experiment Station in December 1914 to investigate the value of silage as a feed for horses and mules of various ages. This investigation is to continue until sufficient data is collected to make definite conclusions possible.

The purpose of this thesis is to study the results of this experiment, to summarize the data, and to make possible conclusions, which may be of value to 10,000 silo owners in Missouri and to the large number of farmers in the United States who have this feed at hand.

The data here used covers two twelve-week periods during the winters of 1914-15 and 1915-16 respectively.

The general management of the horses was similar during both trials. The feeds were of practically the same quality except that the corn silage fed in the first trial was

of much better quality than that fed in the second trial. Every precaution was taken to make both years comparable.

An inquiry from this station was sent to all experiment stations in the United States, asking for information on silage as a feed for horses. Virginia, North Carolina, Pennsylvania, Wisconsin and Missouri reported experimental evidence. The Michigan and Tennessee experiment stations have fed silage to horses but have no records to show their results. Illinois, Iowa, Nebraska, Minnesota, Colorado, Texas, Kansas, California, Oklahoma, Kentucky, Georgia, Arizona, Arkansas, Washington and Oregon made general statements of its value as a feed for horses. The following stations have no information: Louisiana, Florida, Maine, Mississippi, Montana, New Hampshire, Massachusetts, New Jersey, North Dakota, South Dakota, Alabama, Ohio, Rhode Island, Connecticut, Delaware, West Virginia, New York, Utah, New Mexico, and South Carolina.

LITERATURE

The available literature on this subject divides itself into five general parts.

Experiment Stations and Colleges - Very few experiment stations have taken up the problem of feeding silage to horses and mules, hence experimental data and information is meager.

¹D. O. Nourse was the first man to feed silage to horses and mules experimentally. His work was done prior to the year 1900. The experiments were undertaken because of a scarcity of forage in certain sections of Virginia, a difficulty which he hoped to alleviate by the use of corn silage.

Silage was fed to two horses and six mules. They were given small quantities of silage for some time before the test proper. After the preliminary period they were fed for six weeks on a ration consisting of all the silage they would eat with hay and corn in addition.

Two lots of horses and mules were fed the following rations:

- a. Corn silage, corn and hay
- b. Corn and hay

The gains in weight of both lots were about equal. The animals were constantly at work except during stormy weather.

It would appear from the results obtained that corn silage would make a desirable roughage for horses when fed in conjunction with grain, hay or stover. The animal should become

¹Virginia Exp. Station Bulletin No. 80
Experiment Station Record Vol. XI, p. 183

accustomed to it by degrees.

¹W. A. Henry, Dean and Director of the Wisconsin Experiment Station, early in the year 1902 expressed a desire that some horsemen try corn silage as a feed for horses. He suggests moderation in its use for young animals, brood mares and idle horses. He presented a discussion of its economic value in feeding farm animals.

²C. W. Burkett at the North Carolina station fed horses and mules belonging to the college, to compare local grown feeding stuffs with each other and with purchased feeds. He concluded, "Corn silage is a superior feed for horses and mules." One of the most satisfactory rations fed in this series of experiments was composed of 21 pounds corn silage, 15 pounds corn, 2 pounds bran, and 1 pound cotton seed meal. The ration proved to be cheap, efficient and wholesome to the animals.

E. G. Ritzman reports that, ³"Silage from para grass has been fed to mules. When fed with about one liter of cane molasses diluted in water and sprinkled throughout they ate it, but when molasses was not mixed with the silage they apparently cared little for it."

⁴W. A. Cochel at the Pennsylvania Experiment Station fed silage to horses. The object was to use the common feeds,

¹Breeders Gazette, May 14, 1902

²North Carolina Exp. Station Bulletin No. 189

³Report of the Assistant Animal Husbandman, Porto Rico Station Report, 1908, pp. 37-39

⁴Pennsylvania Exp. Station Bulletin No. 117

corn, oats and mixed hay as the basic ration, to find whether cottonseed meal could replace oats and cheapen the cost, and to find further if silage could not be substituted for a part of the hay in the ration thus cheapening the cost of fattening horses.

Twenty-one geldings and mares were used. They were classified on the market as "chunks" or "light draft." The horses were divided into three groups of seven each as nearly alike as possible with reference to size, conformation, etc., and were fed for a period of 84 days.

Rations Fed

Group 1, Corn, cottonseed meal, corn silage, mixed hay

" 2, Corn, cottonseed meal, mixed hay

" 3, Corn, oats, mixed hay

The grain ration which started at 8 pounds per day was increased one pound per day for the first week. Hay was fed according to the appetite of the individual horse. Silage was fed in Group 1 at the rate of 5 pounds per head daily at the beginning which was gradually increased to 20 pounds daily.

From the results of the test the following conclusions were drawn:

1. Silage which is made from mature corn, is free from mold, has not been exposed to air too long before feeding, and is properly supplemented with other feeds which will make up the deficiency in protein, can be fed to horses with safety when care is used to have them become gradually accustomed to it.

2. Horses fed silage as a part of their ration consumed less grain, made their gains at less cost per pound, were sleeker and better finished than when fed on rations not containing silage.

¹W. A. Cochel and B. O. Severson report an experiment during the winter of 1910-1911 in which ten grade Percheron and Belgian colts were divided into two groups. One group of four colts received corn silage as a part ration. The other colts received no silage.

Group 1 - Received grain, hay and silage

Group 2 - Received grain and hay

The grain mixture was composed of :

5 parts shelled corn

3 parts oats

2 parts bran

1 part oil meal

During the first three months of the winter -

Group 1 was fed:

5 pounds of grain per head daily

7.4 pounds hay per head daily

8.2 pounds silage per head daily

Group 2 was fed:

5 pounds grain per head daily

10.6 pounds hay per head daily

Group 1 received silage in the morning and hay at

¹Pennsylvania Exp. Station Bulletin No. 122

night.

During the second period of three months the grain ration was increased 7.5 pounds and the hay to 13.1 pounds per head daily in each group.¹ With this method of feeding all the colts came through the winter in excellent condition of flesh, having gained 244.7 pounds per head during the winter feeding period of 168 days.

In order to try silage as a part ration for growing foals an attempt was made at the ²Wisconsin Experiment Station to feed silage to three draft weanlings during a four week period from November 11, 1911 to December 9, 1911.

The silage was fed in pails apart from the regular ration. Two of them were given one pound daily during the time and the third was fed the same quantity from November 24, 1911 to December 9, 1911. It was fed in addition to the regular ration, fresh silage of good quality being given at each feed. At no time did they care for it and usually ignored it entirely. After trying it for some time and not succeeding in getting the foals to eat the silage, the idea of including it as a part of the ration was given up.

It was evident that there was too great a contrast between the silage and the regular ration, silage being rather bitter and having an acid taste, while the regular ration was somewhat sweet. The foals were unaccustomed to any feed of this nature and, since they were receiving abundant nutriment

¹Silage was not fed to Group 1 during the second period

²Thompson and Hughes, Thesis University of Wisconsin, 1912

and a supply of variety from the regular ration, they did not care for the additional feed.

Five draft yearlings, averaging 1050 pounds in weight were started on feed September 28, 1912.¹ Having been on pasture during the previous summer without grain they were in thin condition but growthy. They were fed a ration of 60% ground oats 30% bran and 10% chaffed clover hay for about three weeks prior to the beginning of the test.

Although a good quality of silage was fed, some difficulty was experienced in getting them to eat it at first. The leaves which seemed to contain the least acid were consumed and pieces of the cob with kernels of corn on them were left.

They were started on a ration of 12 pounds ground oats, 8 pounds bran, and 3 pounds of chaffed clover hay, mixed with 22 pounds of corn silage.

Eighteen to twenty pounds of this mixture was consumed daily. The amount of silage was gradually increased until at the end of twenty days they were receiving from sixteen to twenty pounds per head daily. When on full silage feed they were getting a ration composed of 65% silage, 21% ground oats and 14% bran. They consumed from thirty-five to thirty-eight pounds of this mixture per head daily. This ration was fed steadily for forty-nine days. The bran was discontinued at that time because the ration contained two laxative feeds,

¹Baker and Dillon, Thesis University of Wisconsin, 1913

bran and silage, which did not prove satisfactory in the quantities fed. The ration contained 65% corn silage and 35% ground oats. Hay was fed in the racks when they were on full silage feed.

The last ration was fed for a period of three weeks, at the end of which two of the animals were changed to a grain ration of 75% ground oats and 25% bran. In a week another yearling was changed to the same ration. The other two horses received the ration containing silage for the following three weeks. They were then given a ration of 60% ground oats, 20% ground corn and 20% alfalfa hay. The feeding of the last ration resulted in substantial gains in weight.

Silage did not prove satisfactory in the quantities fed. This was due perhaps to the large amount of silage that was fed. It was estimated that they did not gain more than one-half the amount possible had they been fed a more ideal ration.

¹E. A. Trowbridge reports having fed ten yearling mules weighing approximately 650 pounds each for 90 days on an average daily ration of 6.5 pounds of ear corn, 8.6 pounds of mixed hay and 4 pounds of corn silage. The mules made a gain of only 4.8 pounds during the period. No ill results were observed from the use of the silage but the mules did not consume large quantities of it. This, it is thought, may

¹Experiment Station Record No. 32, p. 670
Missouri Exp. Station Circular No. 72

have been due to the fact that the silage was made from rather immature corn. It is advised that corn silage be fed in combination with other feeds and that under no circumstances should spoiled silage, either moldy or rotten, be fed to horses or mules.

The Michigan¹ and Tennessee² Experiment Stations have been feeding silage to horses for a number of years. They have found it economical and safe to feed in quantities of from fifteen to twenty pounds of good silage per head daily. They have no available data.

Digest of information on silage for horses and mules taken from recent publications³ - Corn silage may be safely fed to horses and mules in moderate quantities provided it is of good quality. It is one of the cheapest and best feeds for idle horses, brood mares and horses that are doing light work during the winter months.

It should be fed in small quantities at first and the amount gradually increased until the animal becomes accustomed to it, when a maximum feed of from 10 to 20 pounds may be given daily. It should be fed only where intelligent supervision insures the use of silage of good quality.

¹R. S. Hudson, Michigan Exp. Station

²C. A. Willson, Tennessee Exp. Station

³Henry and Morrison, Feeds and Feeding, 15th edition.
F. W. Woll, Productive Feeding of Farm Animals
W. H. Jordan, The Feeding of Farm Animals

United States Department of Agriculture -¹"Silage was fed in large quantities last winter to some of the Morgan mares on the Government Farm in Vermont, and the results were satisfactory. These mares were left out during the entire winter until just before foaling time in the spring. An open shed afforded protection from storms. The daily ration per mare was 20 pounds of silage and 10 pounds of hay. The attendants report that the mares came thru the winter in better condition than those of a check lot wintered under similar conditions but with a grain ration, and their foals when dropped were all straight and sound."

"During the winter of 1915-1916 Morgan mares weighing 1,000 pounds at the Government Farm,² Middlebury, Vermont, were fed as much as 24 pounds of silage per head. These mares were not working other than raising their foals.

"Corn silage has been fed to work stock at the Government Farm,² Beltsville, Maryland, during the past two winters. These horses average about 1,400 to 1,500 pounds in weight and have been receiving ten to twelve pounds of corn silage a day. The work which they have been performing during the winter months has been very light. Our experience has been that a part of the roughage can be economically made up of silage."

¹Breeders Gazette, February 5, 1913

²Correspondence, April 4, 1916
G. Arthur Bell, Senior Animal Husbandman

The following is an extract from Farmers' Bulletin No. 578. It is presented because of the general information it contains on the subject:

Geo. Rommel, U. S. Department of Agriculture

Farmers' Bulletin No. 578

Silage for Horses

Silage has not been generally fed to horses, partly on account of a certain amount of danger which attends its use for this purpose, but still more, perhaps, on account of prejudice. In many cases horses have been killed by eating moldy silage and the careless person who fed it at once blamed the silage itself, rather than his own carelessness and the mold which really was the cause of the trouble. Horses are peculiarly susceptible to the effects of molds, and under certain conditions certain molds grow on silage which are deadly poisons to both horses and mules. Molds must have air to grow and therefore silage which is packed air tight and fed out rapidly will not become moldy. If the feeder watches the silage carefully as the weather warms up he can soon detect the presence of mold. When mold appears, feeding to horses and mules should stop immediately.

It is also unsafe to feed horses frozen silage on account of the danger of colic. This is practically impossible to avoid in very cold weather, especially in solid wall silos. By taking the days feed from the unfrozen center of the silo and chopping away the frozen silage from the edges and piling the frozen pieces in the center the mass will usually thaw

out in time for the next feed.

Corn to be made into silage for horses should not be cut too green as sour silage will result and may cause colic when fed. The corn should be well matured and cut when the grain is beginning to glaze. The silo should be filled rapidly and the corn should be vigorously tramped and packed while filling. At least three men should be inside the silo, moving constantly, two around the edges and the third across and around the center. This is by far the most important in connection with feeding silage to horses, and the lives of the horses fed on silage may depend on the thoroughness with which the tramping is done. If properly done no danger is likely to result; if not properly done air pockets may form and cause a small mass of mold which the feeder may overlook but which might be sufficient to kill one or more horses.

The value of silage for horses is greatest as a means to carry them through the winter season cheaply or to supplement pasture during drought. As the danger of mold is greater in summer than in winter, silage should not be fed to horses in that season unless a large number of animals are getting it, and the daily consumption is so large as to preclude its formation on the surface.

To cheapen the ration for brood mares in winter no feed has more value than good corn silage. If the grain goes into the silo with the stover no additional grain is needed for brood mares, hay being the only supplementary feed necessary.

If there is little grain on the corn the silage should be supplemented with 1 pound of old process linseed oil meal or cottonseed meal daily per 1,000 pounds live weight.

Horses to be wintered on a silage and hay ration should be started on about 5 pounds of silage daily per 1,000 pounds live weight, the grain and hay ration being gradually decreased as the silage is increased until the ration is 20 pounds silage and 10 pounds of hay daily per 1,000 pounds live weight. It will require about a month to reach the full feed of silage but the period may be decreased somewhat, depending on the judgment and skill of the feeder.

Mares fed in this manner will be in splendid condition for foaling and so far as the writer's experience goes the foals will be fully as vigorous, with just as much size and bone, as if the mares were fed the conventional grain and hay ration.

Work horses when idle can be wintered satisfactorily in this manner, but much silage is not recommended for horses that do heavy work for the same reason that a driving horse cannot do his best while on watery grass pasture.

The writer knows of cases where stallions receive a ration of silage but has had no experience in feeding them in this manner. There seems no reason why silage should not be a valuable feed for stallions during the idle season.

Silage should also be useful for young horses, especially drafters, but here again the writer cannot quote

his own experience and experimental data are meager.

To summarize, silage is safe to feed to horses and mules only when it is made from fairly mature corn, properly stored in the silo. When it is properly stored and is not allowed to mold, no feed exceeds it as a cheap winter ration. It is most valuable for horses and mules which are not at heavy work, such as brood mares and work horses during the slack season. With plenty of grain on the cornstalks, horses will keep in good condition on a ration of 20 pounds of silage and 10 pounds of hay for each 1,000 pounds of live weight.

"It is stated that corn silage has been satisfactorily used at the Mooi River Remount Depot¹ as feed for horses. The daily ration for horses running in paddocks consisted of 4 pounds of chopped corn silage, 2 pounds of alfalfa or forage, a few pounds of crushed corn and an ounce of salt. From the first they liked the ensilage and did reasonably well on it. Many horses not doing well before showed improvement. The droppings were of a particularly healthy nature. The stabled horses also had a few pounds of silage mixed with other feed."

¹ Experiment Station Record No. 18, p. 969

National Agricultural Journal and Univ. Rec.
9 (1906), No. 12, pp. 1123-1128

Answers to Inquiries - Sixteen replies were received from silo owners in Carroll County Missouri in answer to an inquiry sent out from the Missouri Experiment Station. They report having fed silage to horses and mules from one to five years, in quantities ranging from five to thirty pounds per head daily.

With one exception, favorable results were obtained. This man states that some of his mares lost their colts, but he had no definite proof that the silage was the cause. He reports good results from its use with growing and working horses. Its use was heartily recommended with this exception.

Other inquiries were sent to men in Missouri and in other corn belt states. Replies were received from men who have been feeding silage from one to twenty-five years. They report favorable results without exception. Work horses, mules, growing horses, brood mares, and draft stallions have been fed from five to twenty-five pounds of silage per head daily. They state that silage of good quality, made from comparatively mature corn was fed.

¹G. N. Mihills has fed silage for twenty-five years to an average stud of one hundred Percheron horses. Aged stallions, used for breeding purposes, are fed during the winter months about twenty-four pounds of silage daily in conjunction with hay and grain. No silage is fed during the breeding season because of the difficulty of getting mares in foal. Two year old stallions receive about twenty pounds and

¹Elm Grove Stock Farm, Fond du Lac, Wisconsin

the yearlings about fifteen pounds of silage per head daily. Mares with foals at side are fed about twenty pounds per day. This quantity is reduced to fifteen pounds after the foals are weaned.

Growing horses, including mares and geldings, are fed about fifteen pounds per head daily. Foals are fed a small quantity of silage while with their dams and after they are weaned are fed about seven pounds per head daily with grain.

There has never been sickness among his horses which could be attributed to silage.

He claims that his horses always come thru the winter in good breeding condition and that they are in proper shape to be turned upon spring pasture.

Reports of County Farm Advisers - The Missouri county farm advisers assert that in some sections of this state there are comparatively few silos, but in communities where silos are numerous a large proportion of farmers have been feeding silage to their horses and mules the past two to four years.

R. J. Howat in a survey of Saline County found that forty-one out of eighty-four silo owners fed silage to horses and mules and with but one exception its use proved satisfactory. The owner who reported unfavorably had found no bad results, but thought it was not a good horse feed.

In Marion County, I. F. Gillmor found that one hundred farmers fed silage to horses and mules during the winter of 1914-1915. Of this number three reported unsatisfactory

results, only one of whom was sure that silage was the cause.

R. L. Cuff, county representative, Barron, Wisconsin, mentions the fact that both corn and pea silage is being fed by many farmers in that section. Silage is being substituted for a part of the hay in the ration. They consider that their horses come thru the winter in better condition than when fed on dry feed.

"Some canning companies in Wisconsin¹ winter their mules on pea vine silage, ear corn and a little corn fodder. Their mules winter in good condition."

Reports in the Agricultural Press - Many men have noted their personal experience feeding silage to horses in the Breeders Gazette.

Fletcher Brothers² have fed silage to horses since 1890. It was fed in conjunction with grain and hay to work horses and to range horses which were being broken and fitted for market. They are heartily in favor of feeding silage of good quality to horses as a part of the ration.

"Since the preponderance of evidence reported to the Gazette³ strongly recommends the feeding of silage to any kind of stock that will eat it, and since the per cent of losses attributed to its uses is small, even where it has obviously been fed injudiciously, it would seem that there was not ground

¹R. Baker, Ass't Secretary Wisconsin Live Stock Breeders' Ass'n

²Hennepin County Minnesota

³Editorial, Breeders Gazette, March 15, 1911

on which to oppose the careful feeding of a prime quality of silage to any beast by which it is relished.

"Whatever danger may lurk in silage as a supplement to the rations of horses and mules is due in a large measure to the unfit condition of the corn at the time of siloing it. Frosted corn is often converted into silage for no other reason than that it is not adapted to any other use.

"It is chemically and physically unsuited to the purpose if a first grade of silage is desired. Even though it is properly prepared by the cutters and solidly packed into the silo it lacks the quality and natural integrity which the article must possess if it is to be fed without fear of unwelcome results. Silage is of sufficient economic value to warrant the adoption of the most exacting methods in growing and handling corn for the special purpose of its production."

¹"There is no danger in feeding mules a reasonable amount of good corn silage with other grain and hay feeds. About one-half silage and one-half other grain or hay would be a good proportion.

"Moldy or spoiled silage is dangerous for any class of live stock."

²"Horse feeding has been my business for the past 30 years and I now firmly believe that good corn silage is most valuable as a feed for all kinds of horses. With ordinary care no losses will be experienced. Very few cases can be

¹L. M. Monsees, Breeders Gazette, September 24, 1913

²Harry Birkett, Lincoln, Lancaster County, Nebraska
Breeders Gazette, January 6, 1916

absolutely traced in which horses have been killed by feeding silage.

I am now starting my fifth year in feeding silage to draft horses. I was numbered with the doubting five years ago and had to be strongly urged before I would attempt to feed silage to high priced horses, but from the results obtained the first season I became a firm believer in it.

The horses I am now feeding are all draft stallions ranging in ages from one to seven years, and in size from 1,200 to 2,400 pounds. In a large box I mix the following ration: 2 bushels of silage, 1 bushel of ground oats, and 1/2 bushel of wheat bran. This would equal 44 pounds of silage, 22 pounds of oats and 10 pounds of bran. The silage is of good quality made from corn which would go at least 65 bushels per acre and being well matured when put in the silo. To a horse weighing 2,000 pounds I give three feeds a day of eight pounds each, making a total of twenty-four pounds. Between feeds the horses have access to good timothy hay, which they consume in proportions ranging from 6 to 12 pounds daily. They are fed in addition a small ration of corn, two to four pounds, depending upon their condition and needs. The average horse gets about fourteen pounds of silage a day. Some I feed as much as 18 to 20 pounds daily.

I have noticed an absence of colic in our horses and our records will show that we have had less need for veterinary service since we have been feeding silage.

"I look upon good corn silage as a substitute for pasture. It tones up the animal, keeps the digestive tract in good order and undoubtedly acts as an appetizer. It is a cheap feed, and I believe one of the safest and best for breeding horses. It is excellent to mix with such feeds as bran and oats, which are dusty and tend to cause waste when fed in the ordinary way. By mixing such feeds with good corn silage the whole mass is moistened and the animals are very fond of it.

"Care should be exercised in building the silo designed for horse feeding to have it narrow in diameter, thus giving a small feeding surface and plenty of opportunity for packing. The corn should be well matured when put into the silo. It should be cut into small pieces and thoroughly packed. I am now feeding 50 draft stallions and there is not one of them but that is doing well on the silage ration. With ordinary care in using good silage free from mold the best results may be expected."

A summary of the results of experiment stations, colleges and the United States Department of Agriculture trials, the opinions of practical men who have expressed themselves from actual experience, the results of investigations by county agents and the opinion of the agricultural press, shows that corn silage of good quality made from corn that is comparatively well matured, properly put into the silo can be made a part of the ration for horses and mules of various ages under varying conditions.

It was with these facts in mind that an experiment was planned and carried out at the Missouri Experiment Station to get more definite data on the subject.

It is the object of this thesis to study the available data and to make definite conclusions in so far as that is possible.

EXPERIMENT

Silage as a part ration for horses and mules of various ages, under varying conditions.

OBJECT

The object of this experiment was to secure information concerning:

- a. The feeding value of corn silage when fed to horses and mules in conjunction with other feeds.
- b. The most satisfactory combination of corn silage and other feeds for horses and mules of various ages and under varying conditions.

PLAN

Groups and Lots

The animals were divided into groups, basing such division upon age, type, condition, labor performed, and any other factors which affect uniformity. Draft horses, mules and animals of lighter breeds were used. They were divided as follows:

Group A, Mature idle horses and mules

a. Mules

- b. Geldings and open mares

- c. Pregnant mares

Group B, Mature horses and mules performing average
winter farm work

- a. Mules

- b. Geldings and open mares

- c. Pregnant mares

Group C, Growing horses and mules

- a. Mules

- 1. Foals

- 2. Yearlings

- 3. Two Year Olds

- b. Draft Animals

- 1. Foals

- 2. Yearlings

- 3. Two year olds

- c. Animals of light breeds

- 1. Foals

- 2. Yearlings

- 3. Two year olds

Group D, Immature horses and mules performing average
winter farm work

- a. Two and three year old mules

- b. Two and three year old geldings and open mares

- c. Two and three year old pregnant mares

Group E, Immature idle horses and mules

- a. Two and three year old mules

b. Two and three year old geldings and open mares

c. Two and three year old pregnant mares.

The horses and mules in each group were divided into two lots as uniformly equal as possible. Lot one received a ration containing corn silage. Lot two received a check ration in which no silage was fed. The lots were treated in the same manner except as to feed. The work performed by one horse in a team was the same as that performed by the other horse in the team. The teams were not separated during the tests. The quarters, the college horse barn and adjoining lots, and care were as uniform and satisfactory as could be given.

ANIMALS USED

The animals used in the two winter trials were the horse and mule stock used, grown or kept by the Department of Animal Husbandry, College of Agriculture, University of Missouri. This stock included pure bred draft horses, grade draft horses, horses of light breeds and mules.

The horses and mules used in the 1914-1915 test were:

Group A

c. One pair of pure bred saddle mares in foal, Ruth McDonald and Martha 2nd

Group B

a. One team of mules, Jule and Kate
 b. One team of grade draft geldings, Mack and Cap
 c. Two teams of pure bred Percheron mares in foal, Josephine and Forgette, Felibree and Finette

Group C

b. Draft animals

1. One pair draft foals

c. Animals of light breeds

1. One pair of saddle foals
2. One pair of light horses, Pepper, two years old, Lady Advance, one year old

Group D

- b. One team of pure bred Percheron mares, Josephe and Mena

Group E

- b. One pair saddle mares in foal, Iona Rex, three years old and Satelite, two years old

The horses used in the 1915-1916 test were:

Group A

- b. One pair of light mares, June and Jill
- c. Two pair of saddle mares in foal, Martha 2nd and Ruth McDonald, Satelite and Iona Rex

Group B

- b. One team of grade draft geldings, Cap and Mack
- c. One team of Percheron mares in foal, Felibree and Forgette

Group C

b. Draft animals

1. Two pair of draft foals
2. One pair of draft yearlings

c. Animals of light breeds

1. One pair of light foals
2. One pair of light yearlings

Group D

- c. One team of pure bred Percheron mares, Mena and Josephe

In addition to the animals grouped in teams or in pairs the following horses were fed silage as a part ration:

Josephine, a pure bred Percheron mare not at work and thought not to be in foal.

Jess, a grade draft mare at work.

Jim, a grade draft gelding not at work.

Magna, a pure bred saddle mare not in foal.

Lady Advance, a two year old standard bred mare which was driven some. (Not in foal)

RATIONS USED IN THIS EXPERIMENT

GROUP	LOT I	LOT II
A	*Grain Alfalfa hay Silage	Grain Alfalfa hay
B	Grain Timothy hay Silage	Grain Timothy hay
C	Grain Alfalfa hay Silage	Grain Alfalfa hay
D	Grain Timothy hay Silage	Grain Timothy hay
E	Grain Alfalfa hay Silage	Grain Alfalfa hay

*Grain, Composed of 2 parts corn, 2 parts oats, and
1 part bran, by weight.

Josephine, Jess and Jim received the same ration as horses in Group B, Lot I. Magna and Lady Advance received the same ration as horses in Group A, Lot I.

PLAN AND METHOD OF FEEDING

The object in feeding the mature horses whether idle or doing average winter farm work, including mules, geldings, open or pregnant mares, was to keep them in thrifty condition rather than to make them fat. The condition and needs of the

individual animal determined the amount of dry matter fed per 1,000 pounds live weight.

Draft horses and mules doing average winter farm work were fed timothy hay. Growing horses and mature horses not doing average winter farm work were fed alfalfa hay. Josephine and Jim , mature horses not at work were fed timothy hay.

The grain, including 2 parts corn, 2 parts oats and 1 part bran, by weight, was thoroughly mixed before feeding.

The horses fed silage as a part ration in the 1914-1915 trial were fed silage in the morning and hay at night. In the 1915-1916 test the silage fed horses received silage at night and hay in the morning. Horses not fed silage received hay at night and in the morning.

The amount of silage that was fed depended upon the size, age, work performed and upon the individuality of each animal in the different groups.

Mature and immature horses doing average winter farm work were fed grain three times per day except Sunday when they were fed the grain mixture twice per day, morning and night. Mature and immature horses doing average farm work received a larger grain ration than did the idle horses.

WEIGHTS

The horses were weighed weekly. The initial weights and the final weights consist of weights taken on three successive days, the second of which in each case was the beginning

and the closing date of the trial. The weights were taken in the morning before feed or water was given. This was done to minimize fluctuations in weights. All feeds were weighed for each individual and feed refused was weighed back and deducted from the amount given.

FEEDS

The grain fed consisted of corn, oats and bran which were purchased on the open market. The corn fed was graded as "Number two mixed." The oats were graded as "Number two White Northern," and the bran fed was of good quality. The roughage consisted of alfalfa and timothy hay, and corn silage. The alfalfa hay and timothy hay were purchased on the open market and were graded as "choice." The corn silage used in the 1914-1915 test was of excellent quality. It was made from corn that was comparatively well matured. It was estimated that the corn would yield sixty-five bushels per acre.

The corn silage fed in the 1915-1916 trial was of only fair quality. The summer of 1915 was extremely wet and part of the corn did not mature. The corn on the land which was well drained was very good, but the corn on the lower ground was poor, having small, partly filled ears. It was estimated that it would yield forty bushels per acre.

TIME

The data to be presented were taken from two tests. The first test started December 24, 1914 and ended March 17, 1915.

The second test started December 17, 1915 and closed March 10, 1916. These two trials extended over two twelve week periods, making a combined total of twenty-four weeks in the two tests.

EXERCISE

The labor performed by the animals doing average winter farm work made other exercise unnecessary. All other horses received exercise in the lots adjoining the college horse barn except in case of inclement weather when they were kept in the horse barn.

WATER

The horses and mules that were at work received fresh water three times daily. The other horses were watered at night and in the morning. Salt was kept before them at all times.

RECORDS

Feed and weight records were kept for each individual animal during the tests. Attached is one of the sheets used in keeping these records. Descriptive records were made of each individual animal at the beginning and at the close of each trial. Photographs of each individual animal and of each pair of animals were taken at the close of the 1914-1915 trial and at the beginning and close of the 1915-1916 trial. Feed samples - A small quantity of each feed was put in a closed container each time that feed was mixed, which made a composite

sample of each feed for each 12 week period. The chemical analysis of the feed samples was made by the Agricultural Chemistry Department, University of Missouri.

DAILY PROGRAM

6:00 A. M., weights taken once a week
6:15 - 6:45 A. M., grain and roughage fed
7:00 - 7:30 A. M., watered
7:15 A. M. - 12 M., forenoon work
8:00 A. M., idle and growing horses turned into lots
12:00 M., horses at work watered and fed grain
1:00 - 5:30 P. M., afternoon work
5:00 P. M., horses in lots brought in and watered
5:30 - 5:45 P. M., work horses watered
5:45 - 6:00 P. M., grain and roughage fed

THE 1914-1915 TEST

CHEMISTS' DATA

It was impossible to run digestion trials in these tests hence the results of digestion trials as given in Henry and Morrison Feeds and Feeding, 1915 edition were used. No tests have been reported on the coefficient of digestibility of corn silage and bran for horses. The coefficient of digestibility of these feeds by ruminants was substituted. "There would not be any wide differences in the digestion coefficients of feeds such as silage and wheat bran for these classes of animals."¹

Timothy hay was fed to mature and immature draft horses and mules at work because of its energy value. It does not have the laxative effect that is characteristic of alfalfa.

Alfalfa hay was fed to the mature light horses to make possible a reduction in the amount of grain in the ration. It was fed to all growing horses not at work because of the amount of digestible protein and ash which it contains.

¹ F. B. Morrison, Ass't Professor of Animal Husbandry, University of Wisconsin.

TABLE I

CHEMICAL ANALYSIS OF FEEDS USED*

	FEED	% NITRO- GEN	% CRUDE PROTEIN	% WATER	% FAT	% ASH	% FIBER CRUDE	% N.F.E.	% CARBO- HYDRATES
Rough- ages	Silage, air dry	1.347	8.419	6.668	4.830	4.585	17.755	57.743	75.498
	Silage, fresh	.559	3.494	61.290	2.003	1.902	7.364	23.947	31.311
	Timothy	.900	5.625	6.225	2.293	5.103	33.033	47.721	80.754
	Alfalfa	2.296	14.350	6.065	2.350	8.715	33.658	34.862	68.520
Concen- trates	Corn	1.575	10.844	13.798	2.578	1.273	1.960	69.547	71.507
	Oats	2.028	12.675	9.420	4.880	3.653	12.178	57.194	69.372
	Bran	2.769	17.306	10.268	4.335	5.845	8.800	53.446	62.246

*Department of Agricultural Chemistry, University of Missouri

The Agricultural Chemistry Department furnished the analysis of the air dry material. The author made the calculations for the composition of the fresh silage, protein, nitrogen free extract and carbohydrates.

A comparison of the chemical analyses¹ of the feeds used in this test with recent analyses of the same feeds as reported by Henry and Morrison, 1915 edition of Feeds and Feeding, shows the following: The silage fed was of excellent quality, being considerably lower in water content, somewhat higher in fiber and ash, and considerably higher in crude protein, nitrogen free extract and fat than the average of recent analyses.

The timothy hay was decidedly lower in water content, nitrogen free extract and slightly lower in crude protein and fat than the average for timothy as stated in Henry and Morrison Feeds and Feeding. It was higher in fiber and ash.

In comparison with the averages of recent analyses presented in the last edition of Henry and Morrison Feeds and Feeding, the alfalfa hay fed was lower in per cent of water, practically the same in crude protein, ash and fat. It was higher in fiber and slightly lower in nitrogen free extract.

The corn fed was higher in water content, slightly higher in crude protein, lower in ash and fat, and was practically the same in fiber and nitrogen free extract as the average of recent analyses for corn.

A comparison of the oats used with the average of recent analyses for oats shows that they were practically the same in percentage of water, ash, crude protein, higher in fiber and fat and slightly lower in nitrogen free extract

¹ Table I

The bran which was fed contained about the same amount of water, nitrogen free extract and fat as the average for recent analyses of bran. It was slightly lower in ash and fiber and slightly higher in crude protein.

TABLE II
AVERAGE DIGESTIBILITY OF FEEDS² - EXPERIMENTS WITH HORSES

FEED	% PROTEIN	% FIBER	% N.F.E	% FAT	AUTHORITY
Timothy	21	43	47	47	Henry and Morrison
Alfalfa	73	46	70	14	Mentzel and Lengerke ³
Corn	58	44	83	48	Henry and Morrison
Oats	80	29	75	71	Mentzel and Lengerke
¹ (Corn Silage	51	65	71	82	Lindsey ⁴
(Bran	78	31	72	68	Henry and Morrison

¹Experiments with ruminants

²Henry and Morrison, 1915 edition

³Landwirtschaftliche Kalender, 1914

⁴Massachusetts Exp. Station report, 1911

From Table II it will be noted that horses are able to digest more than eighty per cent of the nitrogen free extract in corn. About one-half of the crude protein, fiber and fat in corn is digested by horses.

Horses digest a high percentage of the nutrients in oats, except in the case of the fiber.

The coefficient of digestibility of timothy hay for

horses is from forty-three to forty-seven for fiber, nitrogen free extract and fat, and twenty-one in the case of crude protein.

Horses digest about seventy per cent of the crude protein and nitrogen free extract, and about fifty per cent of the fiber in alfalfa hay. Fourteen per cent of the fat in alfalfa hay is digested by horses.

"¹The richer the feed, the more nearly do the digestive powers of the horse approach those of other animals. They digest less fiber than the ruminant in whose paunch the coarse feeds undergo special preparation and digestion."

TABLE III

DIGESTIBLE NUTRIENTS* IN 100 POUNDS OF FEEDS USED

FEED	DRY MATTER	PROTEIN	FIBER	N. F. E.	CARBO- HYDRATES	FAT	ASH
Corn silage, fresh	38.710	1.782	4.787	17.002	21.789	1.642	1.902
Timothy	93.775	1.181	14.204	22.429	36.633	1.078	5.103
Alfalfa	93.935	10.476	15.483	24.403	39.1886	.329	8.715
Corn	86.202	6.290	.862	57.724	58.586	1.237	1.273
Oats	90.580	10.140	3.532	42.896	46.428	3.465	3.653
Bran	89.732	13.499	2.728	38.481	41.209	2.948	5.845

NUTRIENTS IN 100 POUNDS OF GRAIN FED, COMPOSED
OF 2 POUNDS CORN, 2 POUNDS OATS AND 1 POUND BRAN BY WEIGHT

Corn 2-Oats 2- Bran 1	88.659	9.272	2.303	47.944	50.247	2.470	3.135
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¹ Henry and Morrison, p. 52, 1915 edition

*Pounds

A comparison of the digestible nutrients in one hundred pounds of corn silage with those in one hundred pounds of timothy hay as seen in Table III shows that there is nearly two and one-half times as much dry matter in timothy hay as there is in silage. There is three times as much digestible fiber, slightly more digestible nitrogen free extract, more than one and one-half times as much digestible carbohydrates and more than two and one-half times as much ash, however, there is one and one-half times as much digestible protein and fat in one hundred pounds of silage as there is in the same amount of timothy hay.

In one hundred pounds of alfalfa hay there is two and one-half times as much dry matter, more than six times as much digestible protein, more than three times as much digestible fiber, more than one and one-half times as much digestible nitrogen free extract, nearly twice as much digestible carbohydrates and five times as much ash as there is in the same amount of corn silage.

The corn silage contained more than five times as much digestible fat.

DESCRIPTION OF HORSES IN THE 1914-1915 TEST

LOT I

LOT II

GROUP	NAME AND	NUMBER	AGE	BREED	NAME AND	NUMBER	AGE	BREED
A-c	Ruth McDonald	No.11	10	Light	Martha 2nd	No.12	12	Light
B-a	Julie	No. 9	13	Mule	Kate	No.10	16	Mule
b	Mack	No. 7	8	Grade	Cap	No. 8	8	Grade
				Draft				Draft
c	Josephine	No. 1	12	Draft	Forgette ¹	No. 2	7	Draft
c	Felibree ²	No. 3	3	Draft	Finette- ¹	No. 4	6	Draft
C-b-1	Stud Foal	No.19	Foal	Draft	Filly Foal ³	No.20	Foal	Draft
c-1	Ruth Squirrel	No.17	"	Light	Magna of	No.18	"	Light
				Estill				
c-2	Pepper	No.15	2	Light	Lady	No.16	1	Light
				Advance				
D-b	Josephe	No. 5	2	Draft	Mena	No. 6	2	Draft
E-b	Iona Rex	No.13	3	Light	Satelite	No.14	2	Light

MANAGEMENT DURING SUMMER AND FALL PREVIOUS TO THE BEGINNING OF THE TEST

Horses numbers 1, 2, 4, 7, 8 and mules numbers 9 and 10 were on dry feed and were worked during the summer and fall. Numbers 3 and 5 were on pasture until July and number 6 was on pasture until October 1st. They were put on dry feed and worked when they were brought in from pasture. The other horses were not worked.

Numbers 12, 19 and 20 were on dry feed during the summer and fall. Numbers 11 and 17 were on pasture until September 1st, and numbers 13, 14, 15, 16 and 18 were on pasture until October 30th when they were put on dry feed.

¹Proved later not in foal

²Dam, Finette, Sire, Gardiner

³Dam, Josephine, Sire, Gardiner

FEED RECEIVED

Tables IV, IV, VI, VII, VIII, IX, X, XI and XII give the quantity of feed consumed, work performed and weights of each individual by weekly periods. In addition the total and the average daily consumption of feed are shown. These data are presented for weekly periods in order that variations in the amount of feed consumed and in weight may be noted.

The "silage fed horses" did not consume large quantities of the silage the first week. They ate from one pound daily in the case of draft foal Number 19 to 7.57 pounds per day in the case of the aged saddle mare, Ruth McDonald No. 11. The hay and in most cases the grain was reduced at the end of the first week, after which larger quantities of silage were consumed.

At the close of the experiment the horses were eating from 6 pounds daily in the case of saddle foal, Ruth Squirrel No. 17 to 12.39 pounds in case of the "in foal" draft brood mare, Felibree No. 3.

It was natural that small quantities of silage were consumed at first because the horses had all been on dry feed for some time and none of them had ever been fed silage before.

The average of the "silage fed horses" ate less silage the last week of the test than they had previously consumed. The silage fed the last week was of poor quality. It contained a high per cent of water and acid, being near the

bottom of the silo.

DIGESTIBLE NUTRIENTS RECEIVED

Tables IV^A, V^A, VI^A, VII^A, VIII^A, IX^A, X^A, XI^A, and XII^A, show the total digestible nutrients received and the average digestible nutrients fed daily. They also present the total digestible nutrients consumed and the average digestible nutrients received daily per 1,000 pounds live weight of the horses.

This was based on the average weight of each horse thru the test.

TABLE IV

Group A

MATURE IDLE HORSES AND MULES

c. Pregnant Mares

Lot I. Ruth McDonald, No. 11, Registered
Saddle Mare

Lot II. Martha 2nd, No. 12, Registered
Saddle Mare

FEED CONSUMED* AND WEIGHT* BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1914				³			³
Dec. 24				1195			1200
" 31	28	70	53	1170	24	80	1180
1915							
Jan. 7	28	66	60	1205	28	83.5	1195
" 14	28	56	74.25	1225	28	70	1205
" 21	28	56	80.5	1250	28	68	1220
" 28	28	56	82	1270	28	69.75	1235
Feb. 4	28	56	83.5	1270	28	69	1230
" 11	35	70	83	1290	28	69.75	1250
" 18	35	70	81.75	1280	28	65.75	1220
" 25	35	70	83.5	1315	28	70	1210
March 4	35	70	80.75	1315	28	70	1250
" 11	35	70	81	1330	28	70	1265
" 18	35	70	76	1308	28	70	1245
Total	378	780	919.25	⁴ 113	332	855.75	⁴ 45
Daily Av.	4.5	9.286	10.943		3.95	10.19	

*Pounds

¹ Corn, Oats, Bran, 2 parts - 2 parts - 1 part, by weight

² Alfalfa hay

³ Initial weight

⁴ Gain in weight

TABLE IV^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	378.0	335.131	35.048	189.932	9.337	11.850
² Hay	780.0	732.693	81.713	311.110	2.566	67.977
Silage	919.25	355.842	16.381	200.295	16.094	17.484
Total		1423.666	133.142	701.337	27.997	97.311
Av. Daily		16.948	1.585	8.349	.333	1.158

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1145.301	107.109	564.207	22.526	78.284
Av. Daily	13.635	1.275	6.717	.268	.932

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	332.0	294.348	30.783	166.820	8.20	10.408
² Hay	855.75	803.849	89.648	341.325	2.815	74.579
Total		1098.197	120.431	508.145	11.015	84.987
Av. Daily		13.074	1.434	6.049	.131	1.012

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	899.579	98.650	416.243	9.023	69.616
Av. Daily	10.709	1.174	4.955	.107	.829

¹ Corn, Oats, Bran, 2 parts - two parts - $\frac{1}{2}$ part² Alfalfa hay

*Pounds

GROUP A - c

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915
LOT II MARTHA 2ND, NUMBER 12-LOT I RUTH McDONALD, NUMBER 11

MATURE IDLE PREGNANT MARES

NO SILAGE

SILAGE

Tables IV and IV^A present the data for Group A - c, Lots I and II, mature idle pregnant mares, Ruth McDonald, No. 11 and Martha 2nd, No. 12. Lot I received silage as a part ration. Lot II was fed no silage. Both lots received grain and alfalfa hay.

These mares were nearly equal in weight and both were in medium condition of flesh at the beginning of the experiment. Mare No. 11 was nearly six weeks further advanced in period of gestation than Mare No. 12. Mare No. 11 was bred April 21, 1914 and Mare No. 12 was bred June 10, 1914.

Ruth McDonald, No. 11, produced a foal in the spring of 1914 and suckled this foal until the first of October, about six weeks before this test began. The other mare was not pregnant the previous year.

Lot I gained 68 pounds more than Lot II during the trial. Lot I consumed .55 pounds more grain and .92 pounds less hay daily. In addition to the grain and hay received, Lot I was fed an average of 10.94 pounds of corn silage daily. Lot II was fed grain and hay.

The table of digestible nutrients consumed shows that mare No. 11 received 3.874 pounds of dry matter, slightly more protein and more than one and one-half times as much carbohydrates daily than was consumed by mare No. 12. Mare No. 11 was fed more than twice as much fat and slightly more ash daily than was fed to mare No. 12.

These facts hold true when reduced to a thousand pound basis for the reason that the lots did not differ greatly

in weights.

At the close of the test the silage fed mare was in better condition than mare No. 12. Her hair was in excellent condition, being short and glossy. Neither mare was fat. These mares were in good thrifty breeding condition at the close of the test.

Since this was an initial effort in feeding silage to brood mares at this experiment station, Lot I was allowed to consume more nutrients than Lot II.

TABLE V

GROUP B

MATURE HORSES AND MULES DOING AVERAGE WINTER FARM WORK

a. Mules

Lot I. Jule, No. 9

Lot II. Kate, No. 10

FEED CONSUMED*, WEIGHTS* AND WORK HOURS BY WEEKLY PERIODS

DATE	LOT I					LOT II				
	¹ GRAIN	² HAY	SILAGE	WEIGHT ³	WORK HOURS	¹ GRAIN	² HAY	WEIGHT ³	WORK HOURS	
1914										
Dec.24				⁴ 1460	A B			⁴ 1195	A B	
Dec.31	47.5	74	12.0	1440	3	40.25	80.75	1195		3
1915										
Jan. 7	35.	52.5	45.5	1455	3	41.	83.75	1175		3
Jan.14	47.	54.5	65.	1455	10 34	62.	81.	1190	10	34
Jan.21	51.	55.5	75.25	1450	32	68.	94.	1175		32
Jan.28	51.	56.	64.75	1445	10 25	63.5	94.5	1190	10	25
Feb. 4	42.	56.	79.	1470	4	56.	95.5	1200		4
Feb.11	45.	56.	68.5	1460	25	54.	96.	1215		25
Feb.18	45.	56.	51.	1410		56.	74.75	1180		
Feb.25	35.5	53.5	56.	1390	7	52.	85.	1170		7
Mar. 4	39.5	56.	53.75	1410		52.5	77.5	1190		
Mar.11	42.	56.	75.	1435	2	52.5	82.5	1195		2
Mar.18	42.	56.	80.25	1415	8 7	54.5	88.75	1190	8	7
Total	522.5	682	676	⁵ 45	28 142	652.25	1034	⁵ 5	28 142	
Daily Ave.	6.22	8.12	8.05			7.76	12.31			

*Pounds

¹Corn, oats, Bran, 2-2-1²Timothy hay³A - heavy work, B - medium and light work⁴Initial weight⁵Loss in weight

TABLE V^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	522.50	463.243	48.446	262.541	12.906	16.380
² Hay	682.0	639.546	8.054	249.837	7.352	34.802
Silage	675.0	261.293	12.029	147.074	11.084	12.839
Total		1364.082	68.529	659.452	31.342	64.021
Av. Daily		16.239	.816	7.851	.373	.762

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	947.799	47.616	465.152	21.777	44.481
Av. Daily	11.283	.567	5.538	.259	.530

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	652.25	588.278	60.477	327.736	16.111	20.448
² Hay	1034.0	939.634	12.212	378.785	11.146	52.765
Total		1557.912	72.689	706.521	27.257	73.213
Av. Daily		18.547	.865	8.411	.324	.872

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1308.486	61.051	510.252	22.893	61.491
Av. Daily	15.577	.726	6.074	.273	.732

¹Corn, oats, bran, 2 parts - 2 parts - 1 part, by weight

²Timothy hay

*Pounds

GROUP B - a

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II KATE, NUMBER 10

LOT I JULE, NUMBER 9

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MATURE MULES PERFORMING AVERAGE WINTER FARM WORK

NO SILAGE

SILAGE

Tables V and V^A present the data for Group B-a, mules, Jule No. 9 and Kate No. 10, performing average winter farm work.

Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and timothy hay.

This was the only team of mules fed during either test. The silage fed mule was considerably larger than her mate as is shown by the initial weights. The initial weight of mule No. 9 was 1460 pounds while the initial weight of Mule No. 10 was 1195 pounds. This team was in good working condition at the beginning of the test. Mule No. 9 was in slightly better condition than mule No. 10.

These mules performed 28 hours of heavy work and 142 hours of medium work, making an aggregate of 170 hours of work during the test. They worked an average of 2.36 hours per working day.

Lot I received an average of 1.55 pounds of grain and 4.19 pounds of hay per day less than Lot II. Lot I consumed in addition to the grain and hay fed an average of 8.05 pounds of silage daily.

It will be noted from the table V^A, digestible nutrients consumed, that Lot II received 2.308 pounds of dry matter, .049 pounds of protein, .56 pounds of carbohydrates, .11 pounds of ash more per day than Lot I. Lot I received .049 pounds of fat daily more than Lot II.

When reduced to a thousand pound basis table V^A shows

that Lot II received an average daily excess over Lot I of 4.294 pounds of dry matter, .159 pounds of protein, .536 pounds of carbohydrates, .014 pounds of fat and .202 pounds of ash.

Lot I lost 45 pounds and Lot II lost 5 pounds in weight during the test. At the close of the experiment Lot I, the "silage fed mule," was in much better thrift than Lot II. The hair and skin of the mule that was fed silage was in excellent condition, while the hair and skin of the other mule was in only medium condition.

TABLE VI

GROUP B

MATURE HORSES AND MULES DOING AVERAGE WINTER FARM WORK

b. Geldings and open mares

Lot I. Mack, No. 7, grade draft gelding

Lot II. Cap, No. 8, grade draft gelding

FEED CONSUMED,* WEIGHTS* AND WORK HOURS BY WEEKLY PERIODS

LOT I					LOT II						
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	³ WORK HOURS	¹ GRAIN	² HAY	WEIGHT	³ WORK HOURS		
1914											
Dec. 24				⁴ 1366	A	B			⁴ 1336	A	B
" 31	72.5	75.	10.	1340		41.0	100.	139.	1360		41.0
1915											
Jan. 7	59.	53.5	66.75	1340	10	28.0	100.	132.5	1325	10	28.0
" 14	80.	55.75	78.	1365		57.5	100.	110.5	1340		57.5
" 21	91.	64.	84.25	1340	30	25.	100.	105.	1325	30	25.
" 28	100.	70.	93.75	1390	10	44.0	100.	105.	1320	10	44.0
Feb. 4	100.	70.	97.5	1350		43.5	100.	105.	1300		43.5
" 11	100.	70.	90.	1350		54.0	100.	105.	1325		54.0
" 18	100.	70.	95.	1340		55.0	100.	105.	1310		55.0
" 25	100.	84.	91.5	1330		46.0	100.	105.	1280		46.0
Mch. 4	100.	84.	63.5	1330	10	50.0	100.	111.	1280	10	50.0
" 11	100.	84.	82.	1335	15	27.0	100.	119.	1300	15	27.0
" 18	100.	84.	78.	1329	10	50.0	100.	119.	1292	10	50.0
Total	1102.5	874.25	930.25	⁵ 37	85	521	1200	1361	⁵ 54	85	521
Daily Ave.	13.12	10.4	11.07				14.28	16.2			

*Pounds

¹Corn, oats, bran, 2 - 2 - 1²Timothy hay³A - heavy work, B - medium and light work⁴Initial weight⁵Loss in weight

TABLE VI^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1102.50	977.465	102.224	553.973	27.232	34.573
² Hay	874.50	820.062	10.328	320.356	9.427	44.626
Silage	930.25	360.100	16.577	202.692	15.275	17.693
Total		2157.627	129.129	1077.021	51.934	96.892
Av. Daily		25.686	1.537	12.822	.618	1.153

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1601.053	95.819	799.196	38.537	71.898
Av. Daily	19.060	1.141	5.514	.459	.856

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1200.0	1063.908	111.264	602.964	29.640	37.620
² Hay	1361.0	1276.278	16.073	498.575	14.672	69.452
Total		2340.186	127.337	1101.539	44.312	107.072
Av. Daily		27.859	1.516	13.114	.528	1.275

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1777.122	96.699	836.502	33.650	81.310
Av. Daily	21.156	1.151	9.958	.401	.968

¹ Corn, oats, bran, 2 parts, 2 parts, 1 part

² Timothy hay

*Pounds

GROUP B - b

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II CAP, NUMBER 8

LOT I MACK, NUMBER 7

MATURE GELDINGS PERFORMING AVERAGE WINTER FARM WORK

NO SILAGE

SILAGE

Tables VI and VI^A present the data for Group B-b, grade draft geldings, Mack, No. 7 and Cap, No. 8, performing average winter farm work.

Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and timothy hay. These geldings were in good working condition at the beginning of the test. There was no noticeable difference in their condition. The initial weight of gelding No. 7 was 30 pounds more than the initial weight of gelding No. 8. Gelding No. 7 was a slightly larger framed horse than gelding No. 8, which accounts for the difference in their initial weights.

During the test this team of geldings performed 606 hours of work, 85 hours was classed as heavy work and 521 hours was medium or light work. They performed an average of 8.42 hours labor per working day.

Lot II consumed a daily average of 1.12 pounds of grain and 5.8 pounds of hay more than Lot I. Lot I received an average of 11.07 pounds of silage daily.

Table VI^A shows that Lot II received an average of 2.173 pounds dry matter, .292 pounds carbohydrates and .122 pounds of ash more per day than Lot I. Lot I received an average of .021 pounds of protein and .090 pounds of fat more than Lot II.

When reduced to a thousand pound basis this table shows that Lot II consumed an average per day of 2.096 pounds dry matter, .010 pounds protein and .444 pounds carbohydrates, also .112 pounds of ash more than Lot I. Lot I was fed .058 pounds fat per day more than Lot II.

This team lost in weight during the test. Gelding No. 7 lost 37 pounds and gelding No. 8 lost 54 pounds. They had worked hard during the trial.

At the close of the experiment both horses were in good thrifty working condition. They were not fat. Gelding No. 7 was in slightly better condition of flesh and his coat of hair indicated better thrift than that of gelding No. 8.

TABLE VII

GROUP B

MATURE HORSES AND MULES DOING AVERAGE WINTER FARM WORK

c. - 1 Pregnant mares

Lot I. Josephine, No. 1, Registered
Percheron mare

Lot II. Forgette, No. 2, Registered
Percheron mare

FEED CONSUMED*, WEIGHTS* AND WORK HOURS BY WEEKLY PERIODS

LOT I						LOT II					
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	³ WORK HOURS		¹ GRAIN	² HAY	WEIGHT	³ WORK HOURS	
					A	B				A	B
1914											
Dec. 24				⁴ 1572					⁴ 1637		
" 31	87	60	52.5	1540	27	21	120	111.75	1625	27	21
1915											
Jan. 7	66	46	60.75	1560	25	13	120	110.75	1678	25	13
" 14	91	56	57.	1590			109	103.50	1700		
" 21	100	56	42.	1595		5	100	111.50	1730		5
" 28	107.5	76	38.5	1563		45	100	111.50	1660		45
Feb. 4	110.	84	61.	1560	10	8	100	118.	1670	10	8
" 11	110.	98	61.25	1595		39	100	117.5	1695		39
" 18	110.	98	61.	1620	10	41	100	118.5	1630	10	41
" 25	110.	98	64.	1600		39	100	118.5	1640		39
Mch. 4	110.	96.5	68.25	1620	30	25	100	117.5	1680	30	25
" 11	110.	98	68.	1630		17	100	119.	1710		17
" 18	93.5	98	61.25	1653			85	115.5	1711		
Total	1205	964.5	695.5	⁵ 81	102	253	1234	1373.5	⁵ 74	102	253
Daily Ave.	14.34	11.48	8.28				14.69	16.35			

*Pounds

¹ Corn, oats, bran, 2 - 2 - 1

² Timothy hay

³ A - heavy work, B - medium and light work

⁴ Initial weight

⁵ Gain in weight

TABLE VII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1205.0	1068.341	111.728	605.476	29.764	37.777
² Hay	964.50	904.460	11.391	353.326	10.397	49.218
Silage	695.5	269.228	12.394	151.553	11.420	13.288
Total		2242.029	135.513	1110.355	51.581	100.483
Av. Daily		26.691	1.613	13.218	.614	1.194

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1403.636	84.839	695.145	32.293	62.782
Av. Daily	16.710	1.010	8.276	.384	.747

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1234.0	1094.052	114.416	620.048	30.480	38.686
² Hay	1373.5	1288.0	16.221	503.154	14.806	70.090
Total		2382.052	130.637	1123.202	45.286	108.776
Av. Daily		28.358	1.555	13.371	.539	1.295

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1426.105	78.211	672.447	27.112	65.123
Av. Daily	17.096	.931	8.005	.323	.775

¹ Corn, oats, bran, 2 - 2 - 1

² Timothy hay

*Pounds

GROUP B - c

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II FORGETTE, NUMBER 2

LOT I JOSEPHINE, NUMBER 1

MATURE PREGNANT MARES PERFORMING AVERAGE WINTER FARM WORK

NO SILAGE

SILAGE

Tables VII and VII^A present the data for Group B-c-1 pregnant mares, Josephine No. 1 and Forgette No. 2, performing average winter farm work.

Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and timothy hay.

These mares produced foals in the spring of 1914 and suckled them until the first of October. Josephine was bred May 2nd, 1914 and Forgette was bred May 11, 1914.

Neither mare was fat at the beginning of the test. Mare No. 2 was in slightly better condition of flesh than Mare No. 1. They were in medium breeding condition. Lot II was somewhat heavier in weight than Lot I, at the beginning of the test. Their initial weights were, Lot I 1572 pounds and Lot II 1637 pounds.

These mares were at work slightly more than one-half the time and gained in weight during the test. Lot I gained 81 pounds and Lot II gained 74 pounds during the 12 week period.

Lot II consumed an average of .35 pounds of grain and 4.86 pounds of hay in excess of that consumed by Lot I. In addition to the grain and hay received, Lot I consumed an average of 8.27 pounds of silage daily.

Table VII^A shows that Lot I received an average of .058 pounds of protein and .075 pounds of ash daily in excess of that consumed by Lot II. Lot II consumed an average of 1.667 pounds of dry matter, .153 pounds of carbohydrates

and .101 pounds of fat more per day than Lot I.

When reduced to a thousand pound basis, Lot I consumed a daily average of .386 pounds of dry matter and .028 pounds of ash less than Lot II. An average of .079 pounds of protein, .271 pounds of carbohydrates and .061 pounds of fat was received daily by Lot I in excess of that received by Lot II.

At the close of the test both lots were in good breeding condition. Lot II was still in better condition of flesh. The condition of the hair and skin of the silage fed mare showed her to be in better thrift.

TABLE VIII

GROUP B

MATURE HORSES AND MULES DOING AVERAGE WINTER FARM WORK

c. - 2 Pregnant mares

Lot I. Felibree, No. 3, Registered
Percheron mareLot II. Finette, No. 4, Registered
Percheron mare

FEED CONSUMED*, WEIGHTS* AND WORK HOURS BY WEEKLY PERIODS

DATE	LOT I					LOT II				
	¹ GRAIN	² HAY	SILAGE	WEIGHT	³ WORK HOURS	¹ GRAIN	² HAY	WEIGHT	³ WORK HOURS	
					A B				A B	
1914										
Dec. 24				⁵ 1503				⁵ 1429		
" 31	85	79	37.5	1520	20 6.5	107	143.25	1420	20 6.5	
1915										
Jan. 7	73	60	78.75	1520	30 5.5	107	144.25	1445	30 5.5	
" 14	94	69.5	92.	1535	29.0	103	128.75	1452	29.0	
" 21	100	70.	89.25	1540	41.0	100	119.	1450	41.0	
" 28	100	68.	97.5	1510	40 8.0	100	119.	1425	40 8.0	
Feb. 4	100	70.	97.5	1550	23.0	100	114.5	1480	23.0	
" 11	100	70.	97.75	1545	25.0	100	119.	1480	25.0	
" 18	100	70.	91.	1560	10.0	100	119.	1450	10.0	
" 25	100	70.	97.5	1570	12.0	100	119.	1440	12.0	
Mch. 4	100	70.	94.75	1575	20.	100	119.	1450	20.	
" 11	100	70.	95.25	1610		100	119.	1460		
" 18	100	70.	88.75	1587	30 15.	100	119.	1450	15.	
Total	1152	836.5	1057.5	⁵ 84	120 205	1217	1482.75	⁵ 21	120 205	
Daily Ave.	13.71	9.96	12.59			14.49	17.65			

*Pounds

¹ Corn, oats, bran, 2 - 2 - 1² Timothy hay³ A - heavy work, B - medium and light work⁴ Initial weight⁵ Gain in weight

TABLE VIII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED *

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1152.0	1021.351	106.813	578.845	28.454	36.115
² Hay	863.5	809.747	10.198	316.326	9.309	44.064
Silage	1057.5	409.358	18.845	230.419	17.364	20.114
Total		2240.456	135.856	1125.590	55.127	100.293
Av. Daily		26.672	1.617	13.402	.656	1.194

DIGESTIBLE NUTRIENTS CONSUMED *
PER 1,000 POUNDS LIVE WEIGHT

Total	1452.361	88.068	724.741	35.731	65.014
Av. Daily	17.289	1.048	8.625	.425	.774

LOT II

DIGESTIBLE NUTRIENTS CONSUMED *

¹ Grain	1217.0	1078.980	112.840	611.506	30.060	38.153
² Hay	1482.5	1390.214	17.508	343.084	15.981	75.652
Total		2469.194	130.348	954.590	46.041	113.805
Av. Daily		29.395	1.552	11.364	.548	1.355

DIGESTIBLE NUTRIENTS CONSUMED *
PER 1,000 POUNDS LIVE WEIGHT

Total	1709.177	90.226	660.762	31.869	78.775
Av. Daily	20.347	1.075	7.866	.379	.938

¹Corn, oats, bran, 2 - 2 - 1²Timothy hay

*Pounds

GROUP B - c

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II FINETTE, NUMBER 4

LOT I FELIBREE, NUMBER 3

MATURE MARES PERFORMING AVERAGE WINTER FARM WORK
MARE ON THE RIGHT PREGNANT. MARE ON LEFT NOT PREGNANT

NO SILAGE

SILAGE

Tables VIII and VIII^A present the data for Group B-c-2, pregnant mare Felibree No. 3 and mare Finette No. 4, thought to have been in foal at the beginning of the test. She proved later not to be in foal. This team performed average winter farm work.

Lot I received silage as a part ration. Lot II received no silage. Both lots were fed grain and timothy hay. Finette, No. 4, produced a foal in the spring of 1914, and suckled her foal until October the first. Felibree, No. 3 was not pregnant the previous year. Felibree was bred May 29, 1914, and Finette was bred March 4, 1914.

At the beginning of the trial Felibree was in slightly the better condition, as is shown by the initial weights. The initial weights were, Felibree, No. 3 1503 pounds and Finette, No. 4 1429 pounds.

This team performed a total of 425 hours of work during the test.

A review of Table VIII shows that Lot II received daily an average of .78 pounds of grain and 7.69 pounds of hay in excess of Lot I. Lot I received an average of 12.59 pounds of silage daily.

A discussion of Table VIII^A is omitted because these lots are not comparable. Lot I was in foal and Lot II proved not to be in foal.

There was a striking difference in the condition of these lots at the close of the test. Lot I was in decidedly

the better condition. Her hair and skin indicated excellent thrift.

TABLE IX

GROUP C

GROWING HORSES AND MULES

b. - 1 Draft foals

Lot I. Pure bred Percheron stud foal, No. 19,
Dam, Finette, Sire, Gardiner

Lot II. Pure bred Percheron filly foal,
No. 20, Dam Josephine, Sire, Gardiner.

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1914				³			³
Dec. 24				810			753
" 31	20	30	7.0	825	28	62.5	770
1915							
Jan. 7	14	21	8.5	800	28	65.	765
" 14	14	21	15.0	800	28	72.5	795
" 21	14	21	15.5	800	28	77.	805
" 28	14	25	23.75	810	28	77.	815
Feb. 4	20	35	31.75	820	28	77.	825
" 11	28	35	36.	840	28	77.	845
" 18	28	35	42.	835	28	77.	850
" 25	28	35	42.	840	28	77.	840
Mch. 4	33	35	58.	840	33	77.	840
" 11	35	35	70.	880	35	75.25	825
" 18	35	35	70.	877	35	77.	885
Total	283	363	419.5	⁴ 67	355	891.25	⁴ 132
Daily Ave.	3.37	4.32	5.0		4.22	10.61	

*Pounds

¹ Corn, oats, bran, 2 - 2 - 1

² Alfalfa hay

³ Initial weight

⁴ Gain in weight

TABLE IX^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	283.0	250.905	26.240	142.199	6.990	8.872
² Hay	363.0	340.984	38.028	144.786	1.194	31.635
Silage	419.5	162.388	7.475	91.405	6.888	7.979
Total		754.277	71.743	378.390	15.072	48.486
Av. Daily		8.979	.853	4.505	.179	.577

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	908.767	86.437	455.892	18.159	58.658
Av. Daily	10.819	1.029	5.427	.216	.698

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	355.	314.739	32.916	178.377	8.769	11.129
² Hay	891.	836.961	93.341	355.385	2.931	77.651
Total		1151.700	126.257	533.762	11.700	88.780
Av. Daily		13.711	1.503	6.354	.139	1.057

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1421.642	155.823	658.754	14.440	109.570
Av. Daily	16.927	1.855	7.842	.172	1.304

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay

*pounds

GROUP C - b - 1

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915
LOT II FILLY FOAL, NUMBER 20 - LOT I STUD FOAL, NUMBER 19
DAM, JOSEPHINE, SIRE, GARDINER-DAM, FINETTE, SIRE, GARDINER

GROWING DRAFT FOALS

NO SILAGE

SILAGE

Tables IX and IX^A present the data for Group C-b-1, growing draft foals. Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and alfalfa hay.

Lot I was foaled February 23, 1914 and Lot II was foaled March 12, 1914.

These draft foals had suckled their dams until October the first and had been on dry feed since that time. Lot I weighed 57 pounds more than Lot II at the beginning of the experiment.

Both lots were in thrifty growing condition at the beginning of the test. Lot I gained 57 pounds and Lot II gained 132 pounds during the feeding period.

Lot I consumed a daily average of 85 pounds of grain and 6.28 pounds of hay less than Lot II. Lot I received an average of 5 pounds of silage daily.

It will be noted from the table that Lot I consumed small quantities of the silage during the first four weeks of the test. No gain was made during this time. During the last two weeks of the trial, Lot I was fed 5 pounds of grain, 5 pounds of hay and 10 pounds of silage per day. Substantial gains were made during this time.

Table IX^A shows that Lot II received 4.732 pounds of dry matter, .65 pounds of protein, 1.849 pounds of carbohydrates, and .48 pounds of ash more per day than Lot I. Lot I received .04 pounds of fat more daily than Lot II.

When reduced to a thousand pound basis this table shows that Lot II consumed an average daily excess of 6.108 pounds of dry matter, .826 pounds of protein, 2.415 pounds of carbohydrates and .606 pounds of ash over that consumed by Lot I. Lot I received daily .044 pounds of fat more than Lot II.

There was practically no difference in the condition of fleshing of these foals at the close of the test. They were in thrifty growing condition. The skin and hair of Lot I indicated that this foal was in slightly better thrift at the close of the test than Lot II.

TABLE X

GROUP C

GROWING HORSES AND MULES

c. - 1 Light foals

Lot I Pure bred saddle filly foal
Ruth Squirrel No. 17

Lot II Pure bred saddle filly foal
Magna of Estill No. 18

FEED CONSUMED*AND WEIGHTS*BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1914				³ 549			³ 520
Dec. 24							
" 31	28	35	35.75	555	28	54.25	525
1915							
Jan. 7	28	35	40	525	28	54.25	520
" 14	33.75	29	22.5	550	26	37	530
" 21	28	21	38.25	545	28	35	535
" 28	28	29	40	560	28	41	545
Feb. 4	28	35	40.5	550	28	49	560
" 11	28	35	41.75	565	28	49	570
" 18	28	35	41.5	590	28	49	570
" 25	28	35	42	560	28	49	560
Mch. 4	35	35	42	560	33	49	560
" 11	35	35	42	600	35	49	590
" 18	35	35	42	597	35	49	585
Total	350.75	394	468.25	⁴ 48	353	564.5	⁴ 65
Daily Ave.	4.17	4.69	5.57		4.2	6.72	

*Pounds

¹Corn, oats, Bran, 2 - 2 - 1²Alfalfa hay³Initial weight⁴Gain in weight

TABLE X^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
¹ Grain	350.75	310.971	32.522	176.241	8.664	10.996
² Hay	394.0	370.108	41.275	157.151	1.296	34.337
Silage	468.25	181.260	8.324	102.027	7.689	8.906
Total		862.339	82.121	435.419	17.649	54.239
Av. Daily		10.266	.978	5.184	.210	.646

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1531.985	145.892	773.506	31.176	96.358
Av. Daily	18.238	1.737	9.209	.371	1.147

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	353.0	312.966	32.730	177.372	8.719	11.067
² Hay	564.5	530.270	59.137	225.157	1.857	49.196
Total		843.236	91.867	402.529	10.576	60.263
Av. Daily		10.039	1.094	4.792	.126	.717

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1537.573	167.512	733.979	19.284	109.885
Av. Daily	18.304	1.994	8.739	.230	1.308

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa hay

*Pounds

GROUP C - c - 1

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1916

LOT II MAGNA OF ESTILL

NUMBER 18

LOT I RUTH SQUIRREL

NUMBER 17

LIBRARY UNIV. OF
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1916

GROWING SADDLE FOALS

NO SILAGE

SILAGE

Tables X and X^A present the data for Group C-c-1, growing saddle foals, Ruth Squirrel No. 17 and Magna of Estill No. 18. Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and alfalfa hay.

Lot I was foaled April 13, 1914 and Lot II was foaled April 7, 1914.

Both lots suckled their dams until October 1st. They were on dry feed from that time until the beginning of the experiment. These foals were in medium growing condition at the beginning of the test. Lot I was a finer foal, being lighter in bone and finer in hair and skin than Lot II.

Lot I gained 48 pounds and Lot II gained 65 pounds during the feeding period.

Both lots consumed practically the same amount of grain daily. Lot I received 2.03 pounds of hay less per day than Lot II and was fed in addition an average of 5.57 pounds of silage daily.

From Table X^A it will be noted that Lot I received an average of .227 pounds of dry matter, .392 pounds of carbohydrates and .084 pounds of fat more per day than Lot II. Lot II received daily an average of .116 pounds of protein and .071 pounds of ash more than Lot I.

The table shows when reduced to a thousand pound basis that Lot II received an average daily excess over Lot I of .066 pounds of dry matter, .257 pounds of protein and .161 pounds of ash. The same table shows that Lot I was fed per

thousand pounds live weight .470 pounds of carbohydrates and .141 pounds of fat more per day than Lot II.

Lot II was in better thrift at the close of the trial than Lot I. Her hair and skin were in better condition. This same condition was noted at the beginning of the trial.

TABLE XI

GROUP C

GROWING HORSES AND MULES

c. - 2 One and two year old light horses

Lot I Saddle bred gelding Pepper No. 15

Lot II Standard bred filly Lady Advance No.16

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1914				³			³
Dec. 24				858			765
" 31	20	45.0	28	855	28	82.5	765
1915							
Jan. 7	14	35	53	850	28	94.5	775
" 14	14	36	70.5	880	28	69.	760
" 21	14	42	83.25	865	28	49.	760
" 28	14	42	81.25	870	28	49.	765
Feb. 4	14	42	79.25	880	28	49.	770
" 11	14	42	78.5	880	28	49.	800
" 18	14	42	82.5	870	28	49.	800
" 25	14	42	80.5	850	28	49.	740
Mar. 4	14	42	73.25	880	28	64.	735
" 11	14	42	81.	890	28	70.	820
" 18	14	42	73.75	897	28	70.	800
Total	174	494	862.75	⁴ 39	336	744	⁴ 35
Daily Ave.	2.07	5.88	10.27		4.0	8.86	

*Pounds

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay³Initial weight⁴Gain in weight

TABLE XI^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	174.0	154.267	16.133	87.430	4.298	5.455
² Hay	494.0	464.039	51.751	197.037	5.325	43.053
Silage	862.75	333.971	15.374	187.985	14.166	16.410
Total		952.277	83.258	472.452	23.789	64.918
Av. Daily		11.337	.991	5.624	.283	.773

DIGESTIBLE NUTRIENTS CONSUMED
PER 1,000 POUNDS LIVE WEIGHT

Total	1093.114	95.571	542.325	27.307	74.519
Av. Daily	13.013	1.138	6.456	.325	.887

LOT II

DIGESTIBLE NUTRIENTS CONSUMED

¹ Grain	336.0	297.894	31.154	168.830	8.299	10.534
² Hay	744.0	698.876	79.941	296.752	8.020	64.840
Total		996.770	109.095	465.582	16.319	75.374
Av. Daily		11.866	1.299	5.543	.194	.897

DIGESTIBLE NUTRIENTS CONSUMED
PER 1,000 POUNDS LIVE WEIGHT

Total	1287.467	140.912	601.364	21.096	97.356
Av. Daily	15.327	1.678	7.159	.251	1.159

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa hay

GROUP C - c - 2

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II LADY ADVANCE, NUMBER 16 LOT I PEPPER, NUMBER 15

GROWING LIGHT HORSES

NO SILAGE

SILAGE

Tables XI and XI^A present the data for Group C-c-2, growing light horses, the two year old saddle bred gelding Pepper, No. 15 and the yearling standard bred filly Lady Advance, No. 16.

Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and alfalfa hay.

Lot I was a year older than Lot II and was about 100 pounds heavier. These growing horses were on dry feed since they were brought in from pasture October 30th.

At the beginning of the test Lot II was in much better flesh than Lot I. She was more compact and more closely made throughout. They gained practically the same amount in the test. Lot I gained 39 pounds and Lot II gained 35 pounds.

Lot II received 1.93 pounds of grain and 2.98 pounds of hay more per day than Lot I. Lot I was fed a daily average of 10.27 pounds of silage.

Table XI^A shows that Lot II received a daily average of .529 pounds dry matter, .308 pounds of protein and .124 pounds of ash more than Lot I. Lot I consumed a daily excess of .081 pounds of carbohydrates and .089 pounds of fat over that consumed by Lot II.

When reduced to a thousand pound basis Lot II received per day 2.314 pounds dry matter, .540 pounds protein, .703 pounds carbohydrates and .272 pounds of ash more than Lot I. Lot I received daily .074 pounds of fat more than Lot II.

At the close of the test Lot II was still in better

condition of flesh than Lot I. The hair and skin of Lot I indicated a little better thrift than Lot II.

GROUP D

IMMATURE HORSES AND MULES DOING AVERAGE WINTER FARM WORK

b. Open mares

Lot I Josephe No. 5, Registered Percheron mare
Lot II Mena No. 6, Registered Percheron mare

The data for this team of immature Percheron mares Josephe, No. 5 and Mena, No. 6 performing average winter farm work is omitted.

Josephe, No. 5 refused the silage at the beginning of the test. After the amount of grain and hay fed was reduced this mare ate the silage. She was consuming about 8 pounds of silage per day when she developed a case of destemper and indigestion and had to be taken off the experiment.

GROUP D - b

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II MENA, NUMBER 6

LOT I JOSEPHE, NUMBER 5

IMMATURE OPEN MARES* PERFORMING AVERAGE WINTER FARM WORK

NO SILAGE

SILAGE

*These mares were taken off of the experiment January 20, 1915 for the reason that Lot I, Josephe No. 5 developed a case of distemper and indigestion.

TABLE XII

IMMATURE IDLE HORSES AND MULES

c. Pregnant mares

Lot I Iona Rex No. 13, Registered saddle
mare, two years old

Lot II Satelite No. 14, saddle bred mare,
two years old.

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1914							
Dec. 24				³ 973			³ 1044
" 31	20	50	17.25	960	28	96	1050
1915							
Jan. 7	14	35	42.25	950	28	98	1055
" 14	14	35	64.	985	28	98	1035
" 21	20	35	69.75	990	28	98	1060
" 28	28	35	70.	1000	28	98	1065
Feb. 4	28	35	70.	1000	28	98	1080
" 11	28	35	70.	1000	28	98	1100
" 18	28	35	70.	1000	28	98	1100
" 25	28	35	67.5	1000	28	98	1090
Mch. 4	38	35	80.	1020	28	108	1100
" 11	42	35	80.	1045	28	112	1140
" 18	42	35	78.5	1046	28	112	1140
Total	330	435	779.25	⁴ 73	336	1212	⁴ 96
Daily							
Ave.	3.93	5.18	9.28		4.0	14.42	

*Pounds

¹ Corn, oats, Bran, 2 - 2 - 1

² Alfalfa hay

³ Initial weight

⁴ Gain in weight

TABLE XII^A
LOT I
DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	330.0	292.575	30.598	165.815	8.151	10.346
² Hay	435.0	408.617	45.501	173.504	1.431	37.910
Silage	779.25	301.648	13.886	169.791	12.795	14.821
Total		1002.840	89.985	509.110	22.377	63.077
Av. Daily		11.937	1.071	6.061	.266	.751

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1005.323	90.208	510.371	22.433	64.527
Av. Daily	11.968	1.074	6.076	.267	.768

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	336	297.894	31.154	168.830	8.299	10.534
² Hay	1212.0	1138.492	126.969	483.418	3.987	105.626
Total		1436.386	158.123	652.248	12.286	116.160
Av. Daily		17.100	1.882	7.765	.146	1.383

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1329.661	146.375	603.788	11.373	107.530
Av. Daily	15.829	1.743	7.188	.135	1.280

¹ Corn, oats, bran, 2 - 2 - 1

² Alfalfa hay

*Pounds

GROUP E - b

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 15, 1915

LOT II SATELITE, NUMBER 14

LOT I IONA REX, NUMBER 13

IMMATURE IDLE PREGNANT MARES

NO SILAGE

SILAGE

Tables XII and XII^A present the data for Group E-c, immature idle pregnant mares Iona Rex, No. 13 and Satellite, No. 14.

Lot I was fed silage as a part ration. Lot II received no silage. Both lots were fed grain and alfalfa hay.

These light mares were on pasture until October 30th, after which time they were on dry feed. Iona Rex, No. 13, was bred May 1, 1914 and Satellite was bred May 20, 1914. They had never been bred previous to this time.

Both mares were in medium breeding condition of flesh at the beginning of the test. Their initial weights were, Lot I, 973 pounds and Lot II, 1044 pounds. Lot I gained 73 pounds and Lot II gained 96 pounds in the 12 week feeding period.

Both lots consumed about the same amount of grain during the test. Lot I was fed 5.18 pounds of hay and 9.28 pounds of silage daily. Lot II received per day 14.42 pounds of hay.

Lot II consumed daily an average of 5.163 pounds of dry matter, .811 pounds of protein, 1.704 pounds of carbohydrates and .632 pounds of ash more than Lot I. Lot I received .120 pounds of fat per day in excess of Lot II.

When reduced to a thousand pound basis, Lot II received 3.861 pounds of dry matter, .669 pounds of protein, 1.112 pounds of carbohydrates and .512 pounds of ash more than Lot I.

Lot I received per thousand pounds live weight .132

pounds of fat more per day than Lot II. Both of these mares were in good breeding condition at the close of the test. The silage fed mare was in better thrift than the other mare as was indicated by her hair and skin.

TABLE XIII

SUMMARY OF TOTAL FEED CONSUMED* DURING 1914-15 TEST

LOT I

NAME	¹ GRAIN	HAY	SILAGE
Ruth McDonald No. 11	378	² 780	919.25
Mack No. 7	1102.5	³ 874.25	930.25
Jule No. 9	522.5	³ 682.	676.
Josephine No. 1	1205.	³ 964.5	695.5
Felibree No. 3	1152.	³ 836.5	1057.5
Draft Foal No. 19	283.	² 363.	419.5
Ruth Squirrel No. 17	350.75	² 394.	468.25
Pepper No. 15	174.	² 494.	862.75
Iona Rex No. 13	330.	² 435.	779.25

LOT II

Martha 2nd No. 12	332	² 855.75	
Cap No. 8	1200	³ 1361.	
Kate No. 10	652.25	³ 1034.	
Forgette No. 2	1234.	³ 1373.5	
Finette No. 4	1217.	³ 1482.75	
Draft Foal No. 20	355.	² 891.25	
Magna of Estill No. 18	353.	² 564.5	
Lady Advance No. 16	336.	² 744.	
Satelite No. 14	336.	² 1212.	

¹ Corn, oats, bran, 2 - 2 - 1

² Alfalfa hay

³ Timothy hay

*Pounds

TABLE XIV

SUMMARY OF AVERAGE FEED CONSUMED* PER DAY DURING 1914-1915 TEST

LOT I			
NAME	¹ GRAIN	HAY	SILAGE
Ruth McDonald No. 11	4.5	² 9.27	10.94
Mack No. 7	13.16	³ 10.4	11.07
Jule No. 9	6.21	³ 8.12	8.05
Josephine No. 1	14.34	³ 11.48	8.27
Felibree No. 3	13.71	³ 9.95	12.58
Draft Foal No. 19	3.37	² 4.32	5.0
Ruth Squirrel No. 17	4.16	² 4.69	5.57
Pepper No. 15	2.07	² 5.87	10.26
Iona Rex No. 13	3.93	² 5.18	9.27

LOT II			
Martha 2nd No. 12	3.95	² 10.19	
Cap No. 8	14.28	³ 16.2	
Kate No. 10	7.76	³ 12.31	
Forgette No. 2	14.69	³ 16.34	
Finette No. 4	14.49	³ 17.64	
Draft Foal No. 20	4.22	² 10.6	
Magna of Estill No. 18	4.2	² 6.71	
Lady Advance No. 16	4.0	² 8.85	
Satellite No. 14	4.0	² 14.42	

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa³ Timothy

*Pounds

Tables XIII and XIV present a summary of the total grain, hay and silage, and the average grain, hay and silage consumed per day by all the horses during the 1914-1915 test. The horses in Lot I received silage as a part ration. The horses in Lot II received no silage.

The horses in Lot I received an average of 7.272 pounds of grain, 7.698 pounds of hay and 8.101 pounds of silage per day during the twelve week feeding period. The horses in Lot II consumed an average of 7.954 pounds of grain and 12.584 pounds of hay during the test. The horses in Lot I made a total gain of 421 pounds and the horses in Lot II made a total gain of 409 pounds during the feeding period.

Comparing the average feed consumed per day by both lots it will be noted that an average of 8.101 pounds of silage fed to horses in Lot I replaced .682 pounds of grain and 4.886 pounds of hay in the ration.

TABLE XV

SUMMARY OF TOTAL DIGESTIBLE NUTRIENTS CONSUMED* DURING
1914-1915 TEST

NAME	LOT I				
	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
Ruth McDonald, No. 11	1423.666	133.142	701.337	27.997	97.311
Mack, No. 7	2157.627	129.129	1077.021	51.934	96.892
Julie, No. 9	1364.082	68.529	659.452	31.342	64.021
Josephine, No. 1	2242.029	135.513	1110.355	51.581	100.283
Felibree, No. 3	2240.456	135.856	1125.590	55.127	100.293
Draft Foal, No. 19	754.277	71.743	378.390	15.072	48.486
Ruth Squirrel, No. 17	862.339	82.121	435.419	17.649	54.239
Pepper, No. 15	952.277	83.258	472.452	23.789	64.918
Iona Rex, No. 13	1002.840	89.985	509.110	23.377	63.077

LOT II

Martha 2nd, No. 12	1098.197	120.431	508.145	11.015	84.987
Cap, No. 8	2340.186	127.337	1101.539	44.312	107.072
Kate, No. 10	1559.912	72.689	706.521	27.257	73.213
Forgette, No. 2	2382.052	130.637	1123.202	45.286	108.776
Finette, No. 4	2469.194	130.348	954.590	46.041	113.805
Draft Foal, No. 20	1151.700	126.257	533.762	11.700	88.780
Magna of Estill, No. 18	843.236	91.867	402.529	10.576	60.263
Lady Advance, No. 16	996.770	109.095	465.582	9.431	75.374
Satelite, No. 14	1436.386	158.123	652.248	12.286	116.160

*Pounds

TABLE XVI
SUMMARY OF AVERAGE DAILY DIGESTIBLE
NUTRIENTS CONSUMED* DURING 1914-1915 TEST

LOT I

NAME	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
Ruth McDonald, No. 11	16.948	1.585	8.349	.333	1.158
Mack, No. 7	25.686	1.537	12.822	.618	1.153
Jule, No. 9	16.239	.816	7.851	.373	.762
Josephine, No. 1	26.691	1.613	13.218	.614	1.194
Felibree, No. 3	26.672	1.617	13.402	.656	1.194
Draft Foal, No. 19	8.979	.853	4.505	.179	.577
Ruth Squirrel, No. 17	10.266	.978	5.184	.210	.646
Pepper, No. 15	11.337	.991	5.624	.283	.773
Iona Rex, No. 13	11.937	1.071	6.061	.266	.751

LOT II

Martha 2nd, No. 12	13.074	1.434	6.049	.131	1.012
Cap, No. 8	27.859	1.516	13.114	.528	1.275
Kate, No. 10	18.547	.865	8.411	.324	.872
Forgette, No. 2	28.358	1.555	13.371	.539	1.295
Finette, No. 4	29.395	1.552	11.364	.548	1.355
Draft Foal, No. 20	13.711	1.503	6.354	.139	1.057
Magna of Estill, No. 18	10.039	1.094	4.792	.126	.717
Lady Advance, No. 16	11.866	1.299	5.543	.194	.897
Satelite, No. 14	17.100	1.882	7.765	.146	1.383

*Pounds

Tables XV and XVI present a summary of the total digestible nutrients and the average daily digestible nutrients consumed by the horses in the 1914-1915 test.

Lot I received silage as a part ration. Lot II received no silage.

The horses in this test received on an average, the following nutrients per day:

	Dry Matter	Protein	Carbohydrates	Fat	Ash
Lot I	17.195	1.229	8.557	.392	.912
Lot II	19.105	1.411	8.529	.297	1.096

This table shows that the horses in Lot I received an average of 1.910 pounds of dry matter, .182 pounds of protein and .184 pounds of ash per day less than the horses in Lot II. The horses in Lot I received slightly more energy in the form of .028 pounds of carbohydrates and .095 pounds of fat daily.

TABLE XVII

SUMMARY OF DIGESTIBLE NUTRIENTS CONSUMED* PER THOUSAND POUNDS
LIVE WEIGHT DURING 1914-1915 TEST

LOT I

NAME	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
Ruth McDonald, No. 11	1145.301	107.109	564.207	22.526	78.284
Mack, No. 7	1601.053	95.819	799.196	38.537	71.898
Jule, No. 9	947.799	47.616	465.152	21.777	44.481
Josephine, No. 1	1403.636	84.839	695.145	32.293	62.782
Felibree, No. 3	1452.361	88.068	724.471	35.731	65.014
Draft Foal, No. 19	908.767	86.437	455.892	18.159	58.658
Ruth Squirrel, No. 17	1531.985	145.892	773.506	31.176	96.358
Pepper, No. 15	1093.114	95.571	542.325	27.307	74.519
Iona Rex, No. 13	1005.323	90.208	510.371	22.433	64.527

LOT II

Martha 2nd, No. 12	899.579	98.650	416.243	9.023	69.616
Cap, No. 8	1777.122	96.699	836.502	33.650	81.310
Kate, No. 10	1308.486	61.051	510.252	22.893	61.491
Forgette, No. 2	1426.105	78.211	672.447	27.112	65.123
Finette, No. 4	1709.177	90.226	660.762	31.869	78.775
Draft Foal, No. 20	1421.642	155.823	658.754	14.440	109.570
Magna of Estill, No. 18	1537.573	167.512	733.979	19.284	109.885
Lady Advance, No. 16	1287.467	140.912	601.364	12.182	97.356
Satelite, No. 14	1329.661	146.375	603.788	11.373	107.530

*Pounds

TABLE XVIII

SUMMARY OF AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED*
PER THOUSAND POUNDS LIVE WEIGHT DURING 1914-1915 TEST

LOT I

NAME	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
Ruth McDonald, No. 11	13.635	1.275	6.717	.268	.932
Mack, No. 7	19.060	1.141	9.514	.459	.856
Jule, No. 9	11.283	.567	5.538	.259	.530
Josephine, No. 1	16.710	1.010	8.276	.384	.747
Felibree, No. 3	17.289	1.048	8.625	.425	.774
Draft Foal, No. 19	10.819	1.029	5.427	.216	.698
Ruth Squirrel, No. 17	18.238	1.737	9.209	.371	1.147
Pepper, No. 15	13.013	1.138	6.456	.325	.887
Iona Rex, No. 13	11.968	1.074	6.076	.267	.768

LOT II

Martha 2nd, No. 12	10.709	1.174	4.955	.107	.829
Cap, No. 8	21.156	1.151	9.958	.401	.968
Kate, No. 10	15.577	.726	6.074	.273	.732
Forgette, No. 2	17.096	.931	8.005	.323	.775
Finette, No. 4	20.347	1.075	7.866	.379	.938
Draft Foal, No. 20	16.927	1.855	7.842	.172	1.304
Magna of Estill, No. 18	18.304	1.994	8.738	.230	1.308
Lady Advance, No. 16	15.327	1.678	7.159	.145	1.159
Satelite, No. 14	15.829	1.743	7.188	.135	1.280

*Pounds

Tables XVII and XVIII present a summary of the total and average daily digestible nutrients consumed per thousand pounds live weight by the horses in the 1914-1915 test. Lot I received silage as a part ration. Lot II received no silage.

The horses in this test received on an average, the following nutrients daily per thousand pounds live weight:

	Dry Matter	Protein	Carbohydrates	Fat	Ash
Lot I	14.668	1.113	7.315	.330	.815
Lot II	16.808	1.370	7.532	.241	1.044

This table shows that the horses in Lot I consumed an average per thousand pounds live weight of 2.14 pounds dry matter .257 pounds of protein, .217 pounds carbohydrates and .229 pounds of ash per day less than the horses in Lot II. The horses in Lot I consumed an average of .089 pounds of fat per day more than the horses in Lot II.

The horses in Lot I gained a total of 421 pounds and the horses in Lot II gained a total of 409 pounds during the test.

THE 1915-1916 TEST

INTRODUCTION

The second experiment was conducted in order to secure more data and information on the subject of silage as a part ration for horses and mules of various ages under varying conditions than was possible to secure from a single trial.

The 1915-1916 experiment was started December 17, 1915 and closed March 10, 1916. The same kinds of feeds were used in both tests. The general management of the horses was the same in both tests except that silage was fed at night and hay in the morning in the second trial. The horses were fed small quantities of silage before the test began. The quality of the silage fed during the 1915-1916 experiment was not as good as that fed in the 1914-1915 experiment.

TABLE XIX

CHEMICAL ANALYSIS OF FEEDS USED*

	FEED	% NITRO- GEN	% CRUDE PROTEIN	% WATER	% FAT	% ASH	% FIBER CRUDE	% N.F.E.	% CARBO- HYDRATES
Rough- ages	Silage, air dry	1.315	8.219	5.543	3.610	5.200	21.068	56.360	77.428
	Silage, fresh	.496	3.100	64.359	1.362	1.962	7.950	21.267	29.217
	Timothy	.752	4.700	6.643	1.995	4.810	32.430	49.422	81.852
	Alfalfa	2.330	14.563	6.833	2.878	9.128	29.110	37.488	66.598
Concen- trates	Corn	1.582	9.888	9.263	4.235	1.298	2.200	73.116	75.316
	Oats	1.900	11.875	8.135	5.150	3.545	12.770	58.525	71.295
	Oats	1.837	11.481	8.168	5.063	3.055	12.820	59.413	72.233
	Bran	2.605	16.281	8.810	3.813	6.893	3.813	60.390	64.203

*Department of Agricultural Chemistry, University of Missouri

The Agricultural Chemistry Department furnished the analysis of the air dry material. The author made the calculations for the composition of the fresh silage, protein, nitrogen free extract and carbohydrates.

CHEMISTS' DATA

A comparison of the chemical analysis of the feeds used in both trials shows that the fresh silage fed during the second test was decidedly lower in percentage of crude protein, fat, nitrogen free extract and carbohydrates than the silage fed in the first test. It was higher in percentage of moisture, ash and crude fiber.

The timothy hay was considerably lower in crude protein, fat, and ash than that fed during the previous trial. The percentage of moisture, fiber, nitrogen free extract and carbohydrates was practically the same.

In comparison with the previous trial the alfalfa hay used was slightly higher in water content, crude protein, fat, ash, and nitrogen free extract. It was slightly lower in crude fiber and carbohydrates.

The corn fed was slightly lower in crude protein and moisture and practically the same in ash as the corn fed during the previous trial. It was higher in fat, crude fiber, nitrogen free extract and carbohydrates.

A comparison of the oats with those fed in 1914-1915 shows that they were slightly lower in crude protein, moisture and ash. They were slightly higher in fat, crude fiber, nitrogen free extract and carbohydrates.

The bran which was fed contained less crude protein, water, nitrogen free extract and carbohydrates than the bran fed in the previous trial. It contained decidedly less crude protein and slightly more ash.

TABLE XX

AVERAGE DIGESTIBILITY OF FEEDS²- EXPERIMENTS WITH HORSES

	% PROTEIN	% FIBER	% N.F.E.	%FAT	AUTHORITY
Timothy	21	43	47	47	Henry and Morrison
Alfalfa	73	46	70	14	Mentzel and Lengerke ³
Corn	58	44	83	48	Henry and Morrison
Oats	80	29	75	71	Mentzel and Lengerke ³
1 (Corn silage	51	65	71	82	Lindsey ⁴
(Bran	78	31	72	68	Henry and Morrison

¹ Experiment with ruminants

² Henry and Morrison, 1915 edition

³ Landwirtschaftliche Kalender, 1914

⁴ Massachusetts Exp. Station report, 1911

For discussion of Table XX refer to Table II.

TABLE XXI

DIGESTIBLE NUTRIENTS IN 100 POUNDS OF FEEDS USED

FEED	DRY MATTER	PROTEIN	FIBER	N.F.E.	CARBO- HYDRATES	FAT	ASH
Corn silage, fresh	35.641	1.581	5.168	15.100	20.268	1.117	1.962
Timothy	93.357	0.987	13.945	23.228	37.173	0.938	4.810
Alfalfa	93.167	10.631	13.391	26.242	39.633	.403	9.128
Corn	90.737	5.735	.968	60.686	61.654	2.033	1.298
Oats	91.865	9.500	3.703	43.894	47.597	3.657	3.545
Oats	91.832	9.185	3.718	44.560	48.278	3.595	3.055
Bran	91.190	12.699	1.182	43.481	44.663	2.593	6.893

NUTRIENTS IN 100 POUNDS OF GRAIN FED COMPOSED OF 2 POUNDS CORN, 2 POUNDS OATS, 1 POUND BRAN BY WEIGHT

Grain Fed December 17, 1915 - January 20, 1916

91.279	8.634	2.105	50.528	52.633	2.795	3.316
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Grain Fed January 21, 1916 - March 10, 1916

91.266	8.508	2.111	50.795	52.906	2.770	3.120
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A comparison of Table XXI, digestible nutrients in 100 pounds of feeds used in 1915-1916 test with Table III, digestible nutrients in 100 pounds of feeds used in 1914-1915 trial shows that the silage fed in the second trial was lower in dry matter, protein, nitrogen free extract, carbohydrates and fat than the silage fed in the first trial and was higher in crude fiber and ash.

In 100 pounds of timothy hay fed during 1915-1916 there was less digestible protein, fiber, fat and ash than in the first

trial. It contained slightly more nitrogen free extract and carbohydrates.

There was slightly more digestible protein, nitrogen free extract, fat and ash, and slightly less fiber and carbohydrates in the alfalfa hay fed during the second test.

The corn fed during the 1915-1916 trial was slightly lower in protein and slightly higher in dry matter, fiber, nitrogen free extract, carbohydrates, fat and ash than the corn fed during the first trial.

A comparison of the oats fed during the second trial with those fed during the previous test shows that they were slightly lower in protein and ash. They were slightly higher in digestible fiber, nitrogen free extract, carbohydrates and fat.

The bran fed during the 1915-1916 trial was slightly lower in digestible protein, fiber and fat, and higher in nitrogen free extract and carbohydrates than that fed in 1914-1915.

DESCRIPTION OF HORSES IN THE 1915-1916 TEST

LOT I				LOT II			
NAME AND	NUMBER	AGE	BREED	NAME AND	NUMBER	AGE	BREED
Felibree	No. 1	4	Draft	Forgette	No. 2	8	Draft
Mena	No. 3	3	"	Josephe	No. 4	3	"
Cap	No. 5	9	Grade	Mack	No. 6	9	Grade
			Draft				Draft
Martha 2nd	No. 7	13	Light	Ruth McDonald	No. 8	11	Light
Satelite	No. 9	3	"	Iona Rex	No.10	4	"
¹ June	No.11	17	"	Jill	No.12	15	"
Sport	No.13	1	"	Ruth Squirrel	No.14	1	"
			Geld-				
			ing				
Joscelin	No.15	1	Draft	Draft Gelding ⁵	No.16	1	Draft
² Filly Foal	No.17	Foal	Draft	Filly Foal ⁶	No.18	Foal	"
³ Filly Foal	No.19	"	"	Filly Foal ⁷	No.20	"	"
⁴ Stud Foal	No.21	"	Light	Stud Foal ⁸	No.22	"	Light
¹ Josephine	No.23	13	Draft				
Jim	No.25	17	Grade	Draft			
Jess	No.27	8	"	"			
Magna	No.29	14	Light				
Lady Advance	No.31	2	"				

¹Bred late in fall

²Dam, Josephine, Sire, Honorable

³Dam, Felibree, Sire, Honorable

⁴Dam, Ruth McDonald, Sire, Astral King

⁵Dam, Finette, Sire Gardiner

⁶Dam, Forgette, Sire, Honorable

⁷Dam, Cervera, Sire, Honorable

⁸Dam, Iona Rex, Sire, Kentucky's Best

MANAGEMENT DURING SUMMER AND FALL PREVIOUS TO BEGINNING THE TEST

Horses numbered, 3, 4, 5, 6, 25 and 27 were on dry feed summer and fall and worked hard during that period.

Number 11 and No. 31 were on dry feed. Number 11 was worked some and No. 31 driven a little.

Numbers 1, 2 and 23 were on pasture two months. They were brought in and put on dry feed September 5, and put at work.

Number 23 ran a nail in her foot and was lame when the test began.

Numbers 8, 10, 14, 16, 18, 20, 22, 5, 7, 15, 17, 19, 21 and 29 were on pasture until December 10, except for a short time when the colts were weaned.

Number 12 was on dry feed and worked little during the summer.

FEED RECEIVED

Tables XXII, XXIII, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX, XXX, XXXI, XXXII, XXXIII, XXXIV and XXXV, give the quantity of feed consumed, work performed and weights of each individual by weekly periods. In addition the total and average daily consumption of feed are shown. These data are presented for weekly periods in order that variations in the amount of feed consumed and in weight may be noted. The "silage fed horses" consumed per day an average of 3.804 pounds of silage in the case of draft foal No. 19 to 15.908 pounds of silage in case of the saddle brood mare, Satellite No. 9.

The saddle brood mare, Satelite No. 9, and the grade draft gelding, Jim No. 25, not at work, were fed a ration consisting of grain and silage only during the last five weeks of the test. No ill effects were apparent.

DIGESTIBLE NUTRIENTS RECEIVED

Tables XXII^A, XXIII^A, XXIV^A, XXV^A, XXVI^A, XXVII^A, XXIX^A, XXX^A, XXXI^A, XXXII^A, XXXIII^A, XXXIV^A, and XXXV^A show the total digestible nutrients received and the average digestible nutrients fed daily. They also present the total digestible nutrients consumed and the average digestible nutrients received daily per 1,000 pounds live weight of the horses.

This was based on the average weight of each horse thru the test.

TABLE XXII

GROUP A

MATURE IDLE HORSES AND MULES

b. "Open mares"*

Lot I June, No. 11, Standard bred mare

Lot II Jill, No. 12, Standard bred mare

FEED CONSUMED** AND WEIGHT** BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915							
Dec. 17				³ 1030			³ 1010
" 24	28	35	31.5	1040	28	70	1035
" 31	28	35	23.	1040	28	91	1040
1916							
Jan. 7	28	35	47.5	1015	28	91	1020
" 14	28	35	56.	1020	28	91	1020
" 21	28	35	70.	1030	28	91	1040
" 28	28	35	69.	1020	28	112	1030
Feb. 4	28	35	67.	1025	28	112	1025
" 11	28	35	70.	1040	28	112	1050
" 18	28	35	77.	1020	28	112	1030
" 25	28	35	77.	1020	28	112	1020
Mch. 3	28	35	77.	1040	28	112	1050
Mch. 10	28	35	77.	1012	28	112	1028
Total	336	420	742	⁴ 18	336	1218	⁵ 18
Daily Ave.	4.	5.	8.833		4.	14.5	

*Not in foal

¹Corn, oats, Bran, 2 - 2-1²Alfalfa hay³Initial weight⁴Loss in weight⁵Gain in weight

** Pounds

TABLE XXII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	420.0	391.301	44.650	166.459	1.693	38.338
Silage	742.0	264.456	11.731	150.381	8.288	14.558
Total		959.429	85.144	494.218	19.323	63.654
Av. Daily		11.422	1.014	5.884	.230	.758

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	934.205	82.906	481.225	18.815	61.981
Av. Daily	11.122	.987	5.729	.224	.738

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	1218.0	1134.774	129.486	482.730	4.897	111.179
Total		1438.446	158.249	660.108	14.239	121.937
Av. Daily		17.124	1.884	7.858	.170	1.452

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1395.189	153.491	640.260	13.801	118.270
Av. Daily	16.609	1.826	7.622	.164	1.408

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa

*Pounds

GROUP A - b
PHOTOGRAPHED AT THE BEGINNING OF THE EXPERIMENT, DECEMBER 18, 1915
LOT II JILL, NUMBER 12 LOT I JUNE, NUMBER 11

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

NO SILAGE MATURE OPEN MARES SILAGE

Tables XXII and XXII^A present the data for Group A-b, Lots I and II, mature idle open mares, June No. 11 and Jill No. 12. Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and alfalfa hay.

These mares were in medium condition of flesh at the beginning of the experiment. The coat of hair of Jill, No. 12, indicated that she was in slightly better thrift than June, No. 11. Neither mare had suckled a foal the previous summer.

Lot I lost 18 pounds and Lot II gained 18 pounds during the test. Both lots consumed the same quantity of grain. Lot II received 9.5 pounds of hay more per day than Lot I. Lot I consumed an average of 8.833 pounds of silage daily.

Table XXII^A shows that Lot II received daily 5.702 pounds of dry matter, .87 pounds of protein, 1.974 pounds of carbohydrates and .694 pounds of ash more than Lot I. Lot I was fed .06 pounds of fat per day more than Lot II.

These facts hold true when reduced to a thousand pound basis for the reason that the lots did not differ greatly in weights.

At the close of the experiment these lots were in medium condition. There was no perceptible difference in their condition of flesh or thrift.

TABLE XXIII

GROUP A

MATURE IDLE HORSES AND MULES

c. Pregnant mares

Lot I Martha 2nd, No. 7, Registered saddle mare

Lot II Ruth McDonald, No. 8, Registered saddle mare

FEED CONSUMED*AND WEIGHT*BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³			³
Dec. 17				1150			1217
" 24	28	35	49.75	1180	28	70	1240
" 31	28	35	56	1200	28	91	1200
1916							
Jan. 7	28	35	56	1165	28	91	1210
" 14	28	35	84	1165	28	91	1230
" 21	28	35	98	1220	28	91	1270
" 28	28	35	105	1180	28	112	1230
Feb. 4	28	35	105	1200	28	112	1260
" 11	28	35	112	1210	28	112	1280
" 18	28	35	119	1200	28	112	1270
" 25	28	35	119	1200	28	112	1275
Mch. 3	28	35	119	1210	28	112	1300
" 10	28	33.5	119	1233	28	112	1312
Total	336	418.5	1140.75	⁴ 83	336	1218	⁴ 95
Daily Ave.	4	4.982	13.574		4	14.5	

*Pounds

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa hay³ Initial weight⁴ Gain in weight

TABLE XXIII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	418.5	389.904	44.491	125.864	1.687	38.201
Silage	1140.25	406.397	18.027	231.094	12.737	22.372
Total		1099.973	91.281	534.336	23.766	71.331
Av. Daily		13.095	1.087	6.361	.283	.849

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	922.023	76.514	447.893	19.921	59.791
Av. Daily	10.976	.911	5.332	.237	.712

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	1218.0	1134.774	129.486	482.730	4.897	111.179
Total		1438.446	158.249	660.108	14.239	121.937
Av. Daily		17.124	1.884	7.858	.170	1.452

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1147.997	126.296	526.822	11.364	97.316
Av. Daily	13.667	1.504	6.296	.135	1.159

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa

*Pounds

GROUP A - c - 1
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT II RUTH McDONALD, NUMBER 8 LOT I MARTHA 2ND, NUMBER 7

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE IDLE PREGNANT MARES
NO SILAGE SILAGE

Tables XXIII and XXIII^A present the data for Group B-c-1, Lots I and II, mature idle pregnant mares, Martha 2nd, No. 7 and Ruth McDonald, No. 8. Lot I received silage as a part ration, Lot II received no silage. Both lots were fed grain and alfalfa hay.

Mare No. 8 was in better condition than Mare No. 7 at the beginning of the test. Martha 2nd, No. 7, was lame when the trial began. The initial weight of Lot I was 1150 pounds and the initial weight of Lot II was 1217 pounds.

These mares produced foals in the spring of 1915 and suckled their foals until September 10, 1915. Mare No. 7 was bred June 15, 1915 and mare No. 8 was bred April 18, 1915.

Lot I gained 83 pounds and Lot II gained 95 pounds during the twelve week feeding period. Both lots received the same amount of grain. Lot II was fed daily 9.52 pounds of hay more than Lot I. Lot I consumed an average of 13.574 pounds of silage per day.

Referring to the table of digestible nutrients, it will be noted that Lot II received per day an average of 4.029 pounds of dry matter, .797 pounds of protein, 1.497 pounds of carbohydrates and .603 pounds of ash more than Lot I. Lot I consumed .112 pounds of fat per day more than Lot II.

The table of digestible nutrients consumed per thousand pounds live weight shows that Lot II was fed daily 2.691 pounds of dry matter, .593 pounds of protein, .964 pounds of carbohydrates, and .447 pounds of ash more than Lot I. Lot I re-

ceived .102 pounds of fat per day more than Lot II.

Lot II was still in better condition at the close of the experiment than Lot I. Her hair and skin indicated slightly better thrift.

TABLE XXIV

GROUP A

MATURE IDLE HORSES AND MULES

c - 2 Pregnant mares

Lot I Satellite, No. 9, Saddle bred mare

Lot II Iona Rex, No. 10, Registered saddle mare

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³			³
Dec. 17				1130			1033
" 24	28	35	60.25	1135	28	70	1065
" 31	28	35	67	1120	28	91	1050
1916							
Jan. 7	28	35	70	1100	28	91	1050
" 14	28	35	84	1100	28	91	1060
" 21	28	35	98	1110	28	91	1060
" 28	28	35	105	1100	28	112	1030
Feb. 4	28	35	105	1130	28	112	1090
" 11	28		140	1140	28	112	1100
" 18	28		161	1110	28	112	1100
" 25	28		159	1120	28	112	1090
Mch. 3	28		155.5	1130	28	112	1110
" 10	28		131.5	1127	28	109	1100
Total	336	⁵ 245	1336.25	⁴ 3	336	1215	⁶ 67
Daily Ave.	4	⁵ 5	15.908		4	14.64	

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay³Initial weight⁴Loss in weight⁵Fed hay only seven weeks⁶Gain in weight

*Pounds

TABLE XXIV^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	245.0	228.259	26.046	97.101	.987	22.364
Silage	1336.25	476.253	21.126	270.818	14.926	26.217
Total		1008.184	75.935	545.297	25.255	59.339
Av. Daily		12.002	.904	6.492	.265	.706

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	900.969	67.860	487.307	22.569	53.029
Av. Daily	10.726	.808	5.801	.269	.631

LOT II

¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	1215.0	1131.979	129.167	481.541	4.896	110.905
Total		1435.651	157.930	658.919	14.238	121.663
Av. Daily		17.091	1.880	7.844	.170	1.448

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1339.226	147.323	614.663	13.188	113.492
Av. Daily	15.943	1.754	7.306	.157	1.351

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa

*Pounds

GROUP A - c - 2
 PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
 LOT I SATELITE, NUMBER 9 LOT II IONA REX, NUMBER 10

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE IDLE PREGNANT MARES
 SILAGE NO SILAGE

Tables XXIV and XXIV^A present the data for Group A-c-2, Lots I and II, mature idle pregnant mares, Satellite, No. 9 and Iona Rex, No. 10. Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and alfalfa hay.

Mare No. 9 was 97 pounds heavier than mare No. 10 at the beginning of the test. She was a taller, larger framed mare, not so compactly built. The initial weight of Satellite, No. 9 was 1130 pounds and the initial weight of Iona Rex, No. 10 was 1033 pounds.

These mares produced foals in the spring of 1915 and suckled their foals until September 10, 1915.

Mare No. 9 was bred May 29, 1915 and Mare No. 10 was bred April 18, 1915.

Lot I lost 3 pounds and Lot II gained 67 pounds during the test.

Both lots consumed the same amount of grain. Lot I received 5 pounds of hay per day during the first seven weeks of the test. During the last five weeks of the test this lot was fed only silage and grain. Lot I consumed a daily average of 15.908 pounds of silage. Lot II was fed an average of 14.64 pounds of hay per day.

The table of digestible nutrients consumed shows that Lot II received 5.089 pounds of dry matter, .976 pounds of protein, 1.352 pounds of carbohydrates and .742 pounds of ash more per day than Lot I. Lot I consumed an average of .095

pounds of fat per day more than Lot II.

When reduced to a thousand pound basis, Table XXIV^A shows that Lot II consumed daily 5.217 pounds of dry matter, .946 pounds of protein, 1.505 pounds of carbohydrates and .720 pounds of ash more than Lot I. Lot I was fed .112 pounds of fat per day more than Lot II.

When the experiment closed, Lot II was in better condition of flesh. The condition of the hair and skin of Lot I indicated that she was in better thrift than Lot II. Both lots were in medium breeding condition.

TABLE XXV

GROUP B

MATURE HORSES AND MULES PERFORMING AVERAGE WINTER FARM WORK

b. Geldings

Lot I Cap, No. 5, Grade draft gelding
 Lot II Mack, No. 6, Grade draft gelding

FEED CONSUMED*, WEIGHTS* AND WORK HOURS BY WEEKLY PERIODS

DATE	LOT I			LOT II			WORK HOURS	
	¹ GRAIN	² HAY	SILAGE WEIGHT	¹ GRAIN	² HAY	WEIGHT	⁵ A	⁵ B
1915								
Dec. 17				³ 1310		³ 1310		
" 24	100	61	56	1300	100	1300	41	
" 31	100	69	56	1260	100	1290	41	
1916								
Jan. 7	100	70	56	1265	100	1285	22	10
" 14	100	70	84	1260	100	1300	21	5
" 21	100	70	98	1270	100	1300	32	3
" 28	100	68	66.75	1260	100	124.5	45	
Feb. 4	100	70	105	1275	100	1290	41	
" 11	100	58.75	112	1230	100	1250	43	
" 18	100	46	119	1260	111	1260	56	
" 25	100	50	119	1280	120	1250	37	
Mch. 3	100	56	117	1280	120	1290	52	
" 10	100	52.5	119	1280	120	1272	55	
Total	1200	741.25	1137.75	⁴ 30	1271	1386.5	⁴ 28	486 18
Daily Ave.	14.286	8.824	13.545		15.131	16.506		

¹ Corn, oats, bran, 2 - 2 - 1

² Timothy hay

³ Initial weight

⁴ Loss in weight

⁵ A - heavy work, B - medium and light work

*Pounds

TABLE XXV^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1200.0	1094.977	102.726	633.507	33.140	38.420
² Hay	741.25	692.009	7.323	275.545	7.023	35.654
Silage	1137.75	405.505	17.988	230.588	12.709	22.323
Total		2192.491	128.037	1139.640	52.872	96.397
Av. Daily		26.101	1.524	13.567	.629	1.148

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1723.656	100.658	895.943	41.566	75.784
Av. Daily	20.519	1.198	10.666	.495	.902

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1271.0	1159.747	108.767	671.070	35.332	40.635
² Hay	1386.5	1294.395	13.684	515.404	13.005	66.691
Total		2454.142	122.451	1186.474	48.337	107.326
Av. Daily		29.216	1.458	14.125	.575	1.278

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1905.021	191.438	924.765	37.675	83.652
Av. Daily	22.679	1.136	11.009	.449	.996

*Pounds

¹Corn, oats, bran, 2 - 2 - 1²Timothy

GROUP B - b
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT I CAP, NUMBER 5 LOT II MACK, NUMBER 6

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916
LOT II MACK, NUMBER 6 LOT I CAP, NUMBER 5

MATURE GELDINGS PERFORMING AVERAGE WINTER FARM WORK
LOT I, NO. 5, SILAGE LOT II, NO. 6, NO SILAGE

Tables XXV and XXV^A present the data for Group B-b Lots I and II, mature horses performing average winter farm work, Cap, No. 5 and Mack, No. 6. Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and timothy hay.

These horses were in medium condition of flesh at the beginning of the experiment. Cap, No. 5 was in slightly better condition than Mack, No. 6. Their initial weights were the same. This team performed 486 hours of heavy labor and 18 hours of medium and light labor during the test. Lot I lost 30 pounds and Lot II lost 28 pounds during the twelve week feeding period.

Lot II received .845 pounds of grain and 7.682 pounds of hay more per day than Lot I. Lot I consumed an average of 13.545 pounds of silage per day.

The table of digestible nutrients shows that Lot II received 3.115 pounds of dry matter, .558 pounds of carbohydrates, .054 pounds of fat more per day than Lot I. Lot I consumed daily .066 pounds of protein and .13 pounds of ash more than Lot II.

These facts hold true when reduced to a thousand pound basis for the reason that the lots did not differ greatly in weights during the test.

There was no perceptible difference in the condition or thrift of these lots at the close of the experiment.

TABLE XXVI

GROUP B

MATURE HORSES AND MULES PERFORMING AVERAGE WINTER FARM WORK

c. Pregnant mares

Lot I Felibree, No. 1, Registered Percheron mare
 Lot II Forgette, No. 2, Registered Percheron mare

FEED CONSUMED*, WORK HOURS AND WEIGHTS* BY WEEKLY PERIODS

DATE	LOT I				LOT II				5 WORK HOURS	
	1 GRAIN	2 HAY	SILAGE	WEIGHT	1 GRAIN	2 HAY	WEIGHT		A	B
1915										
Dec. 17				3 1533			3 1630			
" 24	100	70	54	1550	100	105	1660	20	12	
" 31	100	70	53.5	1490	100	105	1620	38	6	
1916										
Jan. 7	100	70	56	1530	100	105	1620	33		
" 14	100	70	84	1530	100	105	1630	20		
" 21	100	70	98	1550	100	105	1600	29	5	
" 28	100	70	105	1510	100	126	1615	25	12	
Feb. 4	100	70	105	1520	100	126	1640	44	5	
" 11	100	70	112	1530	100	126	1630	49		
" 18	100	56	119	1545	111	126	1610	36		
" 25	100	56	119	1520	120	122.5	1620	36		
Mch. 3	100	49.5	106	1510	120	124.	1650	48	6	
" 10	100	54	119	1490	120	126.	1637	45		
Total	1200	775.5	1130.5	4 43	1271	1401.5	6 7 443	44		
Daily Ave.	14.286	9.226	13.452		15.131	16.685				

*Pounds

¹Corn, oats, bran, 2 - 2 - 1²Timothy hay³Initial weight⁴Loss in weight⁵A - heavy work, B - medium and light work⁶Gain in weight

TABLE XXVI^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1200.0	1094.977	102.726	633.507	33.140	38.420
² Hay	775.5	723.517	7.649	288.091	7.270	37.278
Silage	1130.5	402.743	17.865	229.017	12.622	22.171
Total		2221.237	128.240	1150.615	53.032	97.869
Av. Daily		26.443	1.527	13.698	.631	1.165

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total		1457.505	84.147	754.997	34.798	64.220
Av. Daily		17.351	1.002	8.988	.414	.765

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1271.0	1159.747	108.767	671.070	35.332	40.635
² Hay	1401.5	1308.398	13.833	520.980	13.146	67.412
Total		2468.145	122.600	1192.050	48.478	108.047
Av. Daily		29.299	1.460	14.191	.577	1.286

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total		1516.060	75.307	732.218	29.778	66.381
Av. Daily		18.048	.897	8.717	.355	.790

¹Corn, oats, bran, 2 - 2 - 1²Timothy

*Pounds

GROUP B-c
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT II FORGETTE, NUMBER 2 LOT I FELIBREE, NUMBER 1

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE PREGNANT MARES PERFORMING AVERAGE WINTER FARM WORK
NO SILAGE SILAGE

Tables XXVI and XXVII^A present the data for Group B-c, Lots I and II, mature pregnant mares performing average winter farm work, Felibree, No. 1 and Forgette, No. 2.

Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and timothy hay.

These mares were in medium breeding condition when the test began. Forgette, No. 2, was nearly 100 pounds heavier. The initial weight of mare No. 1 was 1533 pounds and the initial weight of mare No. 2 was 1630 pounds.

This team performed 443 hours of heavy labor and 44 hours of medium and light labor during the experiment.

Mare, No. 1 lost 43 pounds and mare No. 2 gained 7 pounds during the feeding period.

These mares produced foals in the spring of 1915 and suckled their foals until September 10, 1915.

Felibree, No. 1 was bred June 6, 1915 and Forgette, No. 2 was bred June 21, 1915.

Table XXVI shows that Lot II was fed an average of .845 pounds of grain and 7.459 pounds of hay per day more than Lot I. Lot I received 13.452 pounds of silage per day.

From the table of digestible nutrients it will be noted that Lot II received 2.856 pounds of dry matter, .493 pounds of carbohydrates and .121 pounds of ash per day more than Lot I. Lot I was fed per day .067 pounds of protein and .084 pounds of fat more than Lot II.

When reduced to a thousand pound basis Lot I con-

sumed slightly less dry matter and ash per day than Lot II. Lot I received per thousand pounds .105 pounds of protein, .105 pounds of protein, .271 pounds of carbohydrates and .059 pounds of fat more daily than Lot II.

There was practically no difference in the condition of flesh of these mares at the close of the trial. The hair and skin of Lot I indicated excellent thrift.

TABLE XXVII

GROUP C

GROWING HORSES AND MULES

b - 1 Draft foals

Lot I Filly foal, No. 17, Dam, Josephine,
Sire, Honorable

Lot II Filly foal, No. 18, Dam, Forgette,
Sire, Honorable

FEED CONSUMED*AND WEIGHTS*BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³			³
Dec. 17				773			760
" 24	28	35	16	760	28	37.5	790
" 31	56	35	10	780	56	56.5	810
1916							
Jan. 7	42	35	16.5	770	42	63	800
" 14	42	35	23.5	770	42	60	795
" 21	42	35	27.5	800	42	63	840
" 28	42	35	30.75	800	42	70	830
Feb. 4	42	35	28.5	820	42	70	860
" 11	42	35	24.5	840	42	70	860
" 18	56	35	42	820	56	70	840
" 25	56	35	42	845	56	70	875
Mch. 3	56	35	38.5	870	56	70	900
" 10	63	35	36.	863	63	70	913
Total	567	420	335.75	⁴ 90	567	770	⁴ 153
Daily							
Ave.	6.75	5	3.997		6.75	9.167	

*Pounds

¹ Corn, oats, bran, 2 - 2 - 1

² Alfalfa hay

³ Initial weight

⁴ Gain in weight

TABLE XXVII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED *

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	567.0	517.506	48.505	299.404	15.758	18.102
² Hay	420.0	391.301	44.650	166.459	1.693	38.338
Silage	335.75	120.665	5.308	68.050	3.750	6.587
Total		1029.472	98.463	533.913	21.201	63.027
Av. Daily		12.255	1.172	6.355	.252	.750

DIGESTIBLE NUTRIENTS CONSUMED *
PER 1,000 POUNDS LIVE WEIGHT

Total	1273.311	121.789	659.967	26.000	77.955
Av. Daily	15.158	1.450	7.857	.310	.928

LOT II

DIGESTIBLE NUTRIENTS CONSUMED *

¹ Grain	567.0	517.506	48.505	299.404	15.758	18.102
² Hay	770.0	717.386	81.859	305.174	3.103	70.286
Total		1234.892	130.364	604.578	18.861	88.388
Av. Daily		14.701	1.552	7.197	.225	1.052

DIGESTIBLE NUTRIENTS CONSUMED *
PER 1,000 POUNDS LIVE WEIGHT

Total	1476.437	155.863	723.179	22.550	105.675
Av. Daily	17.577	1.856	8.609	.268	1.258

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa

*Pounds

GROUP C - b - 1

PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT II DRAFT FOAL, NUMBER 18 LOT I DRAFT FOAL, NUMBER 17
DAM, FORGETTE, SIRE, HONORABLE-DAM, JOSEPHINE, SIRE, HONORABLE

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

NO SILAGE

GROWING DRAFT FOALS

SILAGE

Tables XXVII and XXVII^A present the data for Group C-b-1, Lots I and II, Percheron filly foals, Numbers 17 and 18.

Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and alfalfa hay.

At the beginning of the test Lot I weighed 773 pounds and Lot II weighed 760 pounds. There was practically no difference in the condition of these colts when the test began. Lot I gained 90 pounds and Lot II gained 153 pounds during the test. Lot I was foaled April 6, 1915 and Lot II was foaled April 11, 1915. They suckled their dams until September 10, 1915.

Both lots consumed the same quantity of grain during the test. Lot II was fed an average of 4.167 pounds of hay more per day than Lot I. Lot I received an average of 3.997 pounds of silage per day.

The table of digestible nutrients shows that Lot II received an average of 2.446 pounds of dry matter, .38 pounds of protein, .842 pounds of carbohydrates and .302 pounds of ash daily in excess of that consumed by Lot I. Lot I received daily .027 pounds of fat more than Lot II.

When reduced to a thousand pound basis, the table shows that Lot II consumed daily 2.429 pounds of dry matter, .406 pounds of protein, .752 pounds of carbohydrates, .33 pounds of ash more than Lot I. Lot I received slightly more fat than Lot II.

Lot II was in slightly better condition of flesh than Lot I at the close of the test. Lot I was in better thrift than Lot II as was indicated by her hair and skin.

TABLE XXVIII

GROUP C

GROWING HORSES AND MULES

b - 1 Draft foals

Lot I Filly foal, No. 19, Dam, Felibree,
Sire, Honorable

Lot II Filly foal, No. 20, Dam, Cervera,
Sire, Honorable

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³ 697			³ 590
Dec. 17							
" 24	28	33.5	12	710	28	52.5	610
" 31	28	17.5	17.5	710	42	56	610
1916							
Jan. 7	34	35	35	690	34	56	630
" 14	42	17.5	21	720	42	56	640
" 21	42	17.5	21	750	42	56	600
" 28	42	17.5	23	720	42	56	650
Feb. 4	42	17.5	28	710	42	56	680
" 11	42	17.5	28	720	42	56	700
" 18	56	21.0	34.5	710	56	55	700
" 25	55	19.0	35.	710	56	56	720
Mch. 3	56	19.5	35	710	56	56	730
" 10	63	21.0	29.5	705	63	56	733
Total	530	254	319.5	⁴ 8	545	667.5	⁴ 143
Daily Ave.	6.31	3.024	3.804		6.488	7.946	

¹Corn, oats, bran, 2 - 2 - 1

²Alfalfa hay

³Initial weight

⁴Gain in weight

*Pounds

GROUP C - b - 1

PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT II DRAFT FOAL, NUMBER 20 LOT I DRAFT FOAL, NUMBER 19
DAM, CERVERA, SIRE, HONORABLE-DAM, FELIBREE, SIRE, HONORABLE

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PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

GROWING DRAFT FOALS
NO SILAGE

SILAGE

Table XXVIII presents the feed record and weights by weekly periods for Group C-b-1, Lots I and II, Percheron filly foals, Numbers 19 and 20.

Lot I received silage as part ration. Lot II was fed no silage.

Foal No. 19 was scouring at the beginning of the test. December 20, 1915 timothy replaced alfalfa in the ration and no silage was fed. December 24, 1915, the foal, No. 19 was again put on the silage and alfalfa hay ration. January 23, 1916 she was scouring badly again and was put on a ration of grain, timothy hay and silage because the alfalfa had seemed to disagree with her.

The table of digestible nutrients and discussion are omitted for the reason that the ration for Lot I varied so from time to time that the lots are not comparable.

TABLE XXIX

GROUP C

GROWING HORSES AND MULES

b - 2 Draft yearlings

Lot I Joscelin, No. 15, Registered Percheron
MareLot II Yearling gelding, Dam, Finette, Sire
Gardiner

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

LOT I					LOT II		
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³			³
Dec. 17				1133			1140
" 24	70	28	50.75	1140	70	56	1185
" 31	70	35	56.	1130	70	91	1180
1916							
Jan. 7	70	70	56.	1130	70	91	1190
" 14	70	35	84	1140	70	91	1180
" 21	70	35	98	1130	70	91	1220
" 28	70	35	105	1140	70	112	1210
Feb. 4	70	35	105	1160	70	112	1220
" 11	70	35	112	1160	70	112	1230
" 18	70	42	119	1150	70	112	1240
" 25	70	42	119	1168	70	112	1235
Mch. 3	70	42	119	1200	70	112	1250
" 10	70	42	119	1183	70	112	1232
Total	840	476	1142.75	⁴ 50	840	1218	⁴ 92
Daily Ave.	10	5.667	13.604		10	14.5	

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa hay³ Initial weight⁴ Gain in weight

*Pounds

TABLE XXIX^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	840.0	766.680	71.908	443.455	23.346	26.894
² Hay	476.0	443.475	50.606	188.653	1.918	43.449
Silage	1142.75	407.288	18.067	231.601	12.765	22.421
Total		1617.443	140.581	863.709	38.029	92.764
Av. Daily		19.255	1.674	10.282	.453	1.104

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1402.813	121.926	714.399	32.978	80.454
Av. Daily	16.700	1.452	8.505	.393	.958

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	840.0	766.680	71.908	443.455	23.346	26.894
² Hay	1218.0	1134.774	129.486	482.730	4.897	111.179
Total		1901.454	201.394	926.185	28.243	138.073
Av. Daily		22.636	2.398	11.026	.336	1.644

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1649.136	166.579	766.075	23.631	114.204
Av. Daily	19.632	1.983	9.120	.281	1.360

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay

*Pounds

GROUP B - b - 2

PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT I JOSCELIN, NUMBER 15 LOT II YEARLING GELDING, NUMBER 16
DAM, FINETTE, SIRE, GARDINER

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916
LOT II YEARLING GELDING, NO. 16 LOT I JOSCELIN, NUMBER 15

GROWING DRAFT YEARLINGS

LOT II YEARLING GELDING NO. 16 LOT I JOSCELIN, NUMBER 15
NO SILAGE SILAGE

Tables XXIX and XXIX^A present the data for Group B-b-2, Lots I and II, draft yearlings, numbers, 15 and 16.

Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and alfalfa hay.

These draft yearlings were in medium growing condition at the beginning of the test. The initial weight of Lot I was 1133 pounds and the initial weight of Lot II was 1140. Lot I gained 50 pounds and Lot II gained 92 pounds during the test.

Both lots consumed the same quantity of grain. Lot I was fed 8.833 pounds of hay daily less than Lot I. Lot I consumed an average of 13.604 pounds of silage daily.

Lot I received daily 3.381 pounds of dry matter, .724 pounds of protein, .744 pounds of carbohydrates and .54 pounds of ash less than Lot II. Lot I was fed .117 pounds of fat per day more than Lot II.

These facts hold true when reduced to a thousand pound basis for the reason that the lots did not vary greatly in weights during the test.

At the close of the test Lot I was in better condition and her hair and skin indicated better thrift than Lot II.

TABLE XXX

GROUP C

GROWING HORSES AND MULES

c - 1 Saddle Foals

Lot I Stud foal, No. 21, Dam, Ruth McDonald,
Sire, Astral King

Lot II Stud foal, No. 22, Dam, Iona Rex,
Sire, Kentucky's Best

FEED CONSUMED*AND WEIGHTS*BY WEEKLY PERIODS

LOT I					LOT II			
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT	
1915				³ 583			³ 440	
Dec. 17								
" 24	28	34.5	31	591	33	32.75	470	
" 31	28	35	27.5	610	28	35	490	
1916								
Jan. 7	28	35	28	580	28	35	480	
" 14	28	35	28	560	28	35	485	
" 21	28	35	28	560	28	35	480	
" 28	28	35	28	570	28	35	500	
Feb. 4	28	35	28	620	28	35	510	
" 11	28	35	35	640	28	35	570	
" 18	36	35	42	605	28	42	500	
" 25	42	35	42	620	42	42	510	
Mch. 3	42	35	42	640	42	42	525	
" 10	49	31	42	643	49	42	518	
Total	393	415.5	381.5	⁴ 60	390	445.75	⁴ 78	
Daily								
Ave.	4.679	4.946	4.542		4.643	5.307		

¹Corn, oats, bran, 2 - 2 - 1

²Alfalfa hay

³Initial weight

⁴Gain in weight

*Pounds

TABLE XXX^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	393.0	358.693	33.613	207.538	10.921	12.536
² Hay	415.5	387.109	44.172	164.675	1.674	37.927
Silage	381.5	135.970	6.032	77.319	4.216	7.485
Total		881.772	83.817	449.532	16.811	57.948
Av. Daily		10.497	.999	5.352	.200	.690

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1464.738	139.231	746.731	27.925	96.259
Av. Daily	17.437	1.658	8.888	.332	1.146

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	390.0	355.956	33.364	205.937	10.839	12.452
² Hay	445.75	415.292	47.388	180.627	1.796	40.688
Total		771.248	80.752	386.564	12.635	53.140
Av. Daily		9.182	.961	4.602	.150	.633

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1548.683	162.153	776.225	25.372	106.707
Av. Daily	18.437	1.930	9.241	.302	1.271

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa

*Pounds

GROUP C - c - 1
 PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
 LOT II SADDLE FOAL, NUMBER 22 - LOT I SADDLE FOAL, NUMBER 21
 DAM, IONA REX, SIRE, KENTUCKY'S - DAM, RUTH McDONALD, SIRE, ASTRAL
 BEST KING

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

NO SILAGE GROWING SADDLE FOALS SILAGE

Tables XXX and XXX^A present the data for Group C-c, Lots I and II, saddle foals, numbers, 21 and 22.

Lot I received silage as a part ration. Lot II was fed no silage. Both lots were fed grain and alfalfa hay.

This pair of foals was in medium growing condition when the test began. The initial weight of Lot I was 583 pounds and the initial weight of Lot II was 440 pounds. Lot I gained 60 pounds and Lot II 78 pounds during the feeding period.

Lot I was foaled March 27, 1915 and Lot II was foaled April 6, 1916. They suckled their dams until September 10, 1915.

Both lots were fed practically the same quantity of grain. Lot I consumed daily .361 pounds of hay less than Lot II. An average of 4.542 pounds of silage was consumed daily by Lot I.

Table XXX^A shows that Lot I consumed slightly more digestible nutrients than Lot II during the test.

When reduced to a thousand pound basis Lot II received daily an average of 1 pound of dry matter, .272 pounds of protein, .353 pounds of carbohydrates and .125 pounds of ash more than Lot I. Lot I received slightly more fat.

Lot I was in better condition of flesh than Lot II at the close of the experiment. The condition of the coat of hair of Lot I indicated that this lot was in better thrift than Lot II.

TABLE XXXI

GROUP C

GROWING HORSES AND MULES

c - 2 Saddle bred yearlings

Lot I Sport, No. 13, Saddle bred gelding
 Lot II Ruth Squirrel, No. 14, Registered
 saddle filly

FEED CONSUMED*AND WEIGHTS*BY WEEKLY PERIODS

DATE	LOT I				LOT II		
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT
1915				³			³
Dec. 17				683			790
" 24	28	28	51	670	28	56	785
" 21	28	35	49.5	660	28	91	720
1916							
Jan. 7	28	35	56	665	28	91	770
" 14	28	35	56	665	28	91	770
" 21	28	35	84	680	28	91	780
" 28	28	35	84	700	28	112	770
Feb. 4	28	35	84	690	28	112	780
" 11	28	35	89.75	700	28	112	790
" 18	36	35	89.25	690	36	112	800
" 25	42	35	87.75	705	42	112	810
Mch. 3	42	35	87.75	710	42	112	815
" 10	48	33.5	86.75	702	48	108.5	813
Total	392	411.5	906.75	⁴ 19	392	1202.5	⁴ 23
Daily Ave.	4.667	4.9	10.795		4.667	14.315	

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay³Initial weight⁴Gain in weight

*Pounds

TABLE XXXI^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	392.0	357.781	33.528	207.009	10.893	12.505
² Hay	411.5	383.382	43.747	163.090	1.658	37.562
Silage	906.75	323.175	14.336	183.771	10.128	17.790
Total		1064.338	91.611	553.870	22.679	67.857
Av. Daily		12.671	1.090	6.594	.270	.808

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1551.513	133.544	807.392	33.060	98.917
Av. Daily	18.470	1.590	9.612	.394	1.178

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	392.0	357.781	33.528	207.009	10.893	12.505
² Hay	1202.5	1120.343	127.838	476.587	4.846	109.764
Total		1478.124	161.366	683.596	15.739	122.269
Av. Daily		17.597	1.921	8.138	.187	1.456

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1885.362	205.824	871.926	20.075	155.955
Av. Daily	22.445	2.450	10.380	.239	1.857

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay

*Pounds

GROUP C - c - 2
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
LOT II RUTH SQUIRREL, NUMBER 14 LOT I SPORT, NUMBER 13

LIBRARY UNIV. OF CALIF.

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

GROWING SADDLE YEARLINGS
NO SILAGE SILAGE

Tables XXXI and XXXI^A present the data for Group C-o, Lots I and II, saddle bred yearlings, Sport, No. 13 and Ruth Squirrel, No. 14.

Lot I received silage as a part ration. Lot II received no silage. Both lots were fed grain and alfalfa hay.

At the beginning of the experiment these yearlings were in medium growing condition. They were not fat. Lot I weighed 683 pounds when the test began and Lot II 795 pounds. Lot I gained 19 pounds and Lot II gained 23 pounds during the feeding period.

Both lots received the same amount of grain. Lot I was fed 9.415 pounds of hay per day less than Lot II. A daily average of 10.795 pounds of silage was consumed by Lot I.

Table XXXI^A shows that Lot II received daily 4.926 pounds of dry matter, .831 pounds of protein, 1.544 pounds of carbohydrates and .648 pounds of ash more than Lot I. Lot I received per day .083 pounds of fat more than Lot II.

The table of digestible nutrients consumed per thousand pounds live weight shows that Lot II consumed 3.975 pounds of dry matter, .860 pounds of protein, .768 pounds of carbohydrates and .679 pounds of ash more than Lot I. Lot I received .155 pounds of fat more than Lot II.

Lot II was in slightly better condition than Lot I at the close of the test.

TABLE XXXII

GROUP D

IMMATURE HORSES AND MULES PERFORMING AVERAGE WINTER FARM WORK

c. Pregnant mares

Lot I Mena, No. 3, Registered Percheron mare

Lot II Josephe, No. 4, Registered Percheron mare

FEED CONSUMED*, WORK HOURS AND WEIGHTS* BY WEEKLY PERIODS

DATE	LOT I				LOT II				WORK HOURS	
	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	WEIGHT	³	A	B
1915										
Dec. 17				³ 1517			³ 1567			
" 24	100	70	27.25	1500	100	105	1560	40	10	
" 31	100	65	54	1480	100	105	1560	29		
1916										
Jan. 7	100	70	56	1500	100	105	1550	35		
" 14	100	61	56	1470	100	105	1500	37	5	
" 21	100	52	70	1500	100	105	1550	22	4	
" 28	100	68	70	1480	100	126	1510	35		
Feb. 4	100	70	70	1520	100	126	1550	26	9	
" 11	100	67.5	84	1540	100	126	1565	27	7	
" 18	100	52.5	88.5	1510	111	134	1530	31		
" 25	100	50	91.0	1520	120	140	1550	46		
Mch. 3	100	46.5	76.0	1540	120	138	1550	30 ₆		
" 10	100	53.0	88.5	1557	120	140	1570			
Total	1200	725.5	831.25	⁴ 40	1271	1455	⁴ 3	358	35	
Daily Ave.	14.286	8.637	9.896		15.131	17.321				

*Pounds

¹Corn, oats, bran, 2 - 2 - 1²Timothy hay³Initial weight⁴Gain in weight⁵A - heavy work, B - medium and light work⁶Stopped working team until after Mena foaled

TABLE XXXII^A

LOT I

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	1200.0	1094.977	102.726	633.507	33.140	38.420
² Hay	725.5	677.305	7.161	269.690	6.805	34.897
Silage	831.25	296.266	13.142	168.469	9.285	16.309
Total		2068.548	123.029	1071.666	49.230	89.626
Daily Av.		24.626	1.465	12.758	.586	1.067

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1369.899	81.476	709.712	32.603	59.355
Daily Av.	16.308	.970	8.449	.388	.707

LOT II

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1271.0	1159.747	108.767	633.507	35.332	40.635
² Hay	1455.0	1358.344	14.361	540.867	13.648	61.986
Total		2518.091	123.128	1174.374	48.980	102.621
Daily Av.		29.976	1.466	14.100	.583	1.222

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1626.674	79.540	758.640	31.641	66.293
Daily Av.	19.365	.947	9.031	.377	.789

¹Corn, oats, bran, 2 - 2 - 1²Timothy

*Pounds

GROUP C - c
 PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915
 LOT I MENA, NUMBER 3 LOT II JOSEPHE, NUMBER 4

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916
 LOT II JOSEPHE, NUMBER 4 LOT I MENA, NUMBER 3

IMMATURE PREGNANT MARES PERFORMING AVERAGE WINTER FARM WORK
 LOT II JOSEPHE, NO. 4, NO SILAGE LOT I MENA, NO. 3, SILAGE

Tables XXXII and XXXII^A present the data for Group D-c, Lots I and II, immature pregnant mares performing average winter farm work, Mena, No. 3, and Josephe, No. 4.

Lot I received silage as a part ration. Lot II received no silage.

This pair of three year old pregnant mares were in medium breeding condition at the beginning of the test. The initial weight of Mena, No. 3 was 1517 pounds and the initial weight of Josephe, No. 4 was 1567 pounds. Lot I gained 40 pounds and Lot II gained 3 pounds during the test.

This team performed a total of 393 hours of work during the test, most of which is classified as heavy labor.

Mena, No. 3 was bred April 5, 1915 and Josephe, No. 4 was bred May 31, 1915.

Lot II received daily .845 pounds of grain and 7.425 pounds of hay more than Lot I. Lot I was fed a daily average of 9.896 pounds of silage.

From the table of digestible nutrients consumed it will be noted that Lot II received 5.350 pounds of dry matter, 1.342 pounds of carbohydrates and .155 pounds of ash per day more than Lot I. Both lots received practically the same quantity of protein and fat.

When reduced to a thousand pound basis, Lot I received daily 3.067 pounds of dry matter, .582 pounds of carbohydrates and .082 pounds of ash more than Lot I.

Lot I consumed .023 pounds of protein and .011 pounds

of fat per day in excess of that consumed by Lot II.

There was no noticeable difference in the condition of flesh of these lots at the close of the experiment.

The hair and skin of Lot I was in better condition than the hair and skin of Lot II.

TABLE XXXIII

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

JOSEPHINE NO. 23					JESS NO. 27			
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	SILAGE	WEIGHT
1915								
Dec. 17				³ 1447				³ 1403
" 24	70	70	50.25	1475	100	70	34.5	1395
" 31	70	70	55.5	1480	100	70	38.5	1410
1916								
Jan. 7	70	70	56.	1460	100	70	40.75	1370
" 14	70	70	54.	1450	100	70	40.	1370
" 21	70	70	98.	1500	100	70	46.	1400
" 28	70	70	105.	1450	100	70	36.5	1360
Feb. 4	70	70	105.	1470	100	70	43.5	1360
" 11	70	70	112.	1480	100	68	39.	1340
" 18	100	56	119.	1430	105	70	50.5	1340
" 25	100	50	118.	1430	105	69	42.5	1350
Mch. 3	100	56	113.	1445	100	66.5	49.5	1330
" 10	100	54	110.	1442	100	68.	54.5	1353
Total	960	776	1125.75	⁴ 5	1210	831.5	512.25	⁴ 50
Daily								
Ave.	11.427	9.238	13.402		14.405	9.900	6.098	

¹Corn, oats, bran, 2 - 2 - 1²Timothy hay³Initial weight⁴Loss in weight

*Pounds

TABLE XXXIII^A

JOSEPHINE NO. 23

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	960.0	876.199	81.118	506.942	26.680	30.092
² Hay	776.0	724.450	7.659	288.462	7.279	37.326
Silage	1125.75	401.229	17.798	228.156	12.575	22.087
Total		2001.878	106.575	1023.560	46.534	89.505
Av. Daily		23.832	1.269	12.185	.554	1.066

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1373.025	73.097	702.030	31.916	61.389
Av. Daily	16.346	.870	8.258	.380	.731

JESS NO. 27

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	1210.0	1104.384	103.577	638.798	33.642	38.732
² Hay	831.5	776.263	8.207	309.093	7.799	39.995
Silage	512.25	182.571	8.099	103.818	5.722	10.050
Total		2063.218	119.883	1051.709	47.163	88.777
Av. Daily		24.562	1.427	12.520	.561	1.057

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1508.200	87.634	768.793	34.476	64.895
Av. Daily	17.955	1.043	9.152	.410	.772

¹Corn, oats, bran, 2 - 2 - 1²Timothy

*Pounds

JOSEPHINE, NUMBER 23
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE IDLE OPEN DRAFT MARE
SILAGE

JESS, NUMBER 27
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE OPEN DRAFT MARE PERFORMING DELIVERY WORK
SILAGE

The horses Josephine, No. 23, Jim, No. 25, Jess, No. 27, Magna, No. 29 and Lady Advance, No. 31, were fed silage as a part ration.

There was no way of dividing these horses into lots for comparison.

They were fed silage as a part ration in order to get additional data and information on silage as a part ration for horses of various ages and under varying conditions.

Draft horses Josephine, No. 23, Jim, No. 25 and Jess, No. 27 were fed a ration of grain, timothy hay and silage.

Light horses, Magna, No. 29, and Lady Advance, No. 31, were fed a ration of grain, alfalfa hay and silage.

Tables XXXIII and XXXIII^A present the data for Josephine, No. 23, idle registered Percheron mare not in foal, and, Jess, No. 27, open grade draft mare performing delivery work. Both horses were fed grain, timothy hay and silage.

Josephine, No. 23, was in poor condition at the beginning of the test. She was lame, having run a nail in her foot some time previous to the beginning of the feeding period.

Jess, No. 27, was in medium working condition when the test began.

Josephine, No. 23, maintained her weight throughout the test on a ration of 11.427 pounds of grain, 9.238 pounds of hay and 13.402 pounds of silage per day.

Jess, No. 27, lost 50 pounds in weight during the test. She was fed a daily average of 14.405 pounds of grain,

9.9 pounds of hay and 6.098 pounds of silage. It was impossible to keep a record of the work hours performed, but she was in harness from 7:30 A. M. to 5:30 P. M. practically every day.

Per thousand pounds live weight, Josephine, No. 23, consumed daily 16.346 pounds of dry matter, .870 pounds of protein, 8.258 pounds of carbohydrates, .380 pounds of fat and .731 pounds of ash. Jess, No. 27, received per thousand pounds live weight, 17.955 pounds of dry matter, 1.043 pounds of protein, 9.152 pounds of carbohydrates, .410 pounds of fat, and .772 pounds of ash per day.

The hair and skin of these mares at the close of the experiment indicated good thrift.

TABLE XXXIV
FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

JIM NO. 25				
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT
1915				³ 1357
Dec. 17				
" 24	70	70	48	1360
" 31	105	70	52.5	1370
1916				
Jan. 7	100	70	56	1350
" 14	100	70	84	1360
" 21	100	70	98	1360
" 28	70	70	105	1340
Feb. 4	70	70	105	1340
" 11	70		137.5	1355
" 18	70		161.	1330
" 25	70		156.	1340
Mch. 3	70		136.5	1370
" 10	70		131.5	1357
Total	965	⁵ 490	1271.0	⁴ 0
Daily Av.	11.489	⁵ 5.883	15.136	

¹Corn, oats, bran, 2 - 2 - 1

²Timothy hay

³Initial weight

⁴Gain or loss in weight during feeding period

⁵Fed hay only seven weeks

*Pounds

TABLE XXXIV^A
 DIGESTIBLE NUTRIENTS CONSUMED*
 JIM NO. 25

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	965.0	880.583	82.701	509.246	26.849	31.039
² Hay	490.0	457.449	4.836	182.148	4.596	23.569
Silage	1271.0	452.997	20.095	257.594	14.197	24.937
Total		1791.029	107.632	948.988	45.642	79.545
Av. Daily		21.322	1.281	11.298	.543	.947

DIGESTIBLE NUTRIENTS CONSUMED*
 PER 1,000 POUNDS LIVE WEIGHT

Total	1323.746	79.551	701.395	33.734	58.792
Av. Daily	15.759	.947	8.350	.402	.700

¹Corn, oats, bran, 2 - 2 - 1

²Timothy

*Pounds

JIM, NUMBER 25
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE IDLE GELDING
SILAGE

Tables XXXIV and XXXIV^A present the data for Jim, No. 25, idle draft gelding. He was fed a ration of grain, hay and silage.

His initial and final weights were exactly the same. He was maintained for 12 weeks on a ration of 965 pounds of grain, 490 pounds of hay and 1271 pounds of silage.

During the first seven weeks of the test he was fed grain, hay and silage. The last five weeks of the test he was fed only grain and silage.

He consumed per thousand pounds live weight a daily average of 15.759 pounds of dry matter, .947 pounds of protein, 8.35 pounds of carbohydrates, .402 pounds of fat and .7 pounds of ash.

He was in good thrifty condition at the close of the test.

TABLE XXXV

FEED CONSUMED* AND WEIGHTS* BY WEEKLY PERIODS

MAGNA NO. 29					LADY ADVANCE NO. 31			
DATE	¹ GRAIN	² HAY	SILAGE	WEIGHT	¹ GRAIN	² HAY	SILAGE	WEIGHT
1915								
Dec. 17				³ 1043				³ 1017
" 24	28	35	46.5	1060	28	35	45.5	1000
" 31	28	35	50.25	1060	28	35	45.	985
1916								
Jan. 7	28	35	56	1050	56	35	47.5	980
" 14	28	35	55	1050	56	35	56.	970
" 21	28	35	46.75	1060	56	35	84.	1010
" 28	28	35	42.75	1060	56	35	84.	950
Feb. 4	28	35	50.75	1015	56	35	84.	1000
" 11	28	35	48.75	1030	56	35	84.	1010
" 18	28	35	51.	1030	56	35	84.	1000
" 25	28	35	47.5	1020	56	35	84.	1000
Mch. 3	28	35	55.	1030	56	35	84.	1020
" 10	28	35	56.	1027	56	35	80.	1005
Total	336	420	605.25	⁴ 16	616	420	862	⁴ 12
Daily Ave.	4	5	7.205		7.323	5	10.262	

¹Corn, oats, bran, 2 - 2 - 1²Alfalfa hay³Initial weight⁴Loss in weight

*Pounds

TABLE XXXV^A

MAGNA NO. 29

DIGESTIBLE NUTRIENTS CONSUMED*

	TOTAL FEED CONSUMED	DRY MATTER	PROTEIN	CARBO- HYDRATES	FAT	ASH
¹ Grain	336.0	303.672	28.763	177.378	9.342	10.758
² Hay	420.0	391.301	44.650	166.459	1.693	38.338
Silage	605.25	232.558	9.569	122.666	6.761	11.875
Total		927.531	82.982	466.503	17.796	60.971
Av. Daily		11.042	.988	5.554	.212	.726

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	891.000	79.714	448.130	17.105	58.570
Av. Daily	10.607	.949	5.335	.204	.697

LADY ADVANCE NO. 31

DIGESTIBLE NUTRIENTS CONSUMED*

¹ Grain	616.0	560.071	52.691	325.789	17.119	19.658
² Hay	420.0	391.301	44.650	166.459	1.693	38.338
Silage	862.0	307.225	13.628	174.702	9.629	16.912
Total		1258.597	110.969	666.950	28.441	74.908
Av. Daily		14.983	1.321	7.940	.339	.892

DIGESTIBLE NUTRIENTS CONSUMED*
PER 1,000 POUNDS LIVE WEIGHT

Total	1263.652	111.415	669.629	28.558	75.209
Av. Daily	15.044	1.326	7.972	.340	.895

¹ Corn, oats, bran, 2 - 2 - 1² Alfalfa

*Pounds

MAGNA, NUMBER 29
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

MATURE IDLE OPEN SADDLE MARE
SILAGE

LADY ADVANCE, NUMBER 31
PHOTOGRAPHED AT THE BEGINNING OF EXPERIMENT, DECEMBER 18, 1915

PHOTOGRAPHED AT THE CLOSE OF THE EXPERIMENT, MARCH 11, 1916

GROWING STANDARD BRED MARE. SHE WAS USED FOR LIGHT DRIVING.
SILAGE

Tables XXXV and XXXV^A present the data for Magna, No. 29, idle saddle mare not in foal, and two year old standard bred filly, Lady Advance, No. 31.

Both horses were fed grain, alfalfa hay and silage.

Magna, No. 29, was in medium condition and Lady Advance, No. 31 in excellent condition at the beginning of the test.

Magna, No. 29, lost 16 pounds in weight and Lady Advance, No. 31, lost 12 pounds while on the test.

Magna, No. 29, was fed a daily ration of 4 pounds of grain, 5 pounds of alfalfa hay and 7.205 pounds of silage. Lady Advance, No. 31 was fed a daily ration of 7.333 pounds of grain, 5 pounds of hay and 10.262 pounds of silage. She was driven a little each day during the test.

The digestible nutrients consumed by Magna, No. 29, when reduced to a thousand pound basis were, 10.607 pounds of dry matter, .949 pounds of protein, 5.335 pounds of carbohydrates, .204 pounds of fat and .697 pounds of ash per day.

Per thousand pounds live weight, Lady Advance consumed daily 15.044 pounds of dry matter, 1.326 pounds of protein, 7.972 pounds of carbohydrates, .340 pounds of fat and .895 pounds of ash.

These mares were in thrifty condition at the end of the test.

TABLE XXXVI

SUMMARY OF TOTAL FEED CONSUMED* DURING 1915-1916 TEST

LOT I

NAME	NUMBER	⁶ GRAIN	HAY	SILAGE
June	11	336	⁷ 420.0	742.00
Martha 2nd	7	336	⁷ 418.5	1140.25
Satelite	9	336	⁷ 245.	1336.25
Cap	5	1200	⁸ 741.25	1137.75
Felibree	1	1200	⁸ 775.5	1130.50
Filly Foal ¹	17	567	⁷ 420.	335.75
Joscelin	15	840	⁷ 470.	1142.75
Stud Foal ²	21	393	⁷ 415.5	381.50
Sport	13	392	⁷ 411.5	906.75
Mena	3	1200	⁸ 725.5	831.25

LOT II

Jill	12	336	⁷ 1218.	
Ruth McDonald	8	336	⁷ 1218.	
Iona Rex	10	336	⁷ 1215.	
Maack	6	1271	⁸ 1386.5	
Forgette	2	1271	⁸ 1401.5	
Filly Foal ³	18	567	⁷ 770.	
Draft Gelding ⁴	16	840	⁷ 1218.	
Stud Foal ⁵	22	390	⁷ 445.75	
Ruth Squirrel	14	392	⁷ 1202.50	
Joseph	4	1271	⁸ 1455.	
Josephine	23	960	⁸ 776.	1125.75
Jim	25	965	⁸ 490	1271.00
Jess	27	1210	⁸ 831.5	512.25
Magna	29	336	⁷ 420.	605.25
Lady Advance	31	616	⁷ 420.	862.

*Pounds

¹Dam, Josephine, Sire, Honorable²Dam, Ruth McDonald, Sire Astral King³Dam, Forgette, Sire, Honorable⁴Dam, Finette, Sire, Gardiner⁵Dam, Iona Rex, Sire, Kentucky's Best⁶Corn, oats, bran, 2-2-1⁷alfalfa⁸timothy

TABLE XXXVII

SUMMARY OF AVERAGE FEED CONSUMED* PER DAY DURING 1915-1916 TEST

LOT I

NAME	NUMBER	⁶ GRAIN	HAY	SILAGE
June	11	4.0	⁷ 5.0	8.833
Martha 2nd	7	4.0	⁷ 4.982	13.574
Satelite	9	4.0	⁷ 5.	15.908
Cap	5	14.286	⁸ 8.824	13.545
Felibree	1	14.286	⁸ 9.226	13.452
Filly Foal ¹	17	6.75	⁷ 5.0	3.997
Joscelin	15	10.00	⁷ 5.667	13.604
Stud Foal ²	21	4.679	⁷ 4.946	4.542
Sport	13	4.667	⁷ 4.900	10.795
Mena	3	14.286	⁸ 8.637	9.896

LOT II

Jill	12	4.0	⁷ 14.5	
Ruth McDonald	8	4.0	⁷ 14.5	
Iona Rex	10	4.0	⁷ 14.64	
Mack	6	15.131	⁸ 16.506	
Forgette	2	15.131	⁸ 16.685	
Filly Foal ³	18	6.75	⁷ 9.167	
Draft Gelding ⁴	16	10.00	⁷ 14.500	
Stud Foal ⁵	22	4.643	⁷ 5.307	
Ruth Squirrel	14	4.667	⁷ 14.315	
Josephe	4	15.131	⁸ 17.321	
Josephine	23	11.427	⁸ 9.238	13.402
Jim	25	11.489	⁸ 5.833	15.136
Jess	27	14.405	⁸ 9.900	6.098
Magna	29	4.00	⁷ 5.00	7.205
Lady Advance	31	7.333	⁷ 5.00	10.262

*Pounds

¹Dam, Josephine, Sire, Honorable²Dam, Ruth McDonald, Sire, Astral King³Dam, Forgette, Sire, Honorable⁴Dam, Finette, Sire, Gardiner⁵Dam, Iona Rex, Sire, Kentucky's Best⁶Corn, oats, bran, 2-2-1⁷Alfalfa⁸Timothy

Tables XXXVI and XXXVII present a summary of the total grain and silage and the average grain, hay and silage consumed per day by all the horses during the 1915-1916 test. The horses in Lot I received silage as a part ration. The horses in Lot II received no silage.

The horses in Lot I received an average of 8.090 pounds of grain, 6.218 pounds of hay and 10.815 pounds of silage per day.

The horses in Lot II consumed a daily average of 8.345 pounds of grain and 13.745 pounds of hay during the test.

The horses in Lot I made a total gain of 262 pounds and the horses in Lot II made a total gain of 638 pounds during the feeding period.

The five horses, Josephine, No. 23, Jim, No. 25, Jess, No. 27, Magna, No. 29, and Lady Advance, No. 31, received a daily average of 9.731 pounds of grain, 7.828 pounds of hay and 10.421 pounds of silage during the test.

Comparing the average feed consumed by both lots it will be noted that an average of 10.815 pounds of silage fed to horses in Lot I replaced .255 pounds of grain and 7.527 pounds of hay in the ration.

The horses in Lot I did not gain as much as the horses in Lot II. The average of the horses in Lot I showed as much thrift as the average of horses in Lot II at the close of the test.

TABLE XXXVIII

SUMMARY OF TOTAL DIGESTIBLE NUTRIENTS CONSUMED* DURING 1915-1916 TEST

LOT I

NAME	NO.	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
June	11	959.429	85.144	494.218	19.323	63.654
Martha 2nd	7	1099.973	91.281	534.336	28.766	71.331
Satelite	9	1088.184	75.935	545.297	25.255	59.339
Cap	5	2192.491	128.037	1139.640	52.872	96.397
Felibree	1	2221.237	128.240	1150.615	53.032	97.869
Filly Foal ¹	17	1029.472	98.463	533.913	21.201	63.027
Joscelin	15	1617.443	140.581	863.709	38.029	92.764
Stud Foal ²	21	881.772	83.817	449.532	16.811	57.948
Sport	13	1064.338	91.611	553.870	22.679	67.857
Mena	3	2068.548	123.029	1071.666	49.230	89.626

LOT II

Jill	12	1438.446	158.249	660.108	14.239	121.937
Ruth McDonald	8	1438.446	158.249	660.108	14.239	121.937
Iona Rex	10	1435.651	157.930	658.919	14.238	121.663
Mack	6	2454.142	122.451	1186.474	48.337	107.326
Forgette	2	2468.145	122.600	1192.050	48.478	108.047
Filly Foal ³	18	1234.892	130.364	604.578	18.861	88.388
Draft Gelding ⁴	16	1901.454	201.394	926.185	28.243	138.073
Stud Foal ⁵	22	771.248	80.752	386.564	12.635	53.140
Ruth Squirrel	14	1478.124	161.366	683.596	15.739	122.269
Joseph	4	2518.091	123.128	1174.374	48.980	102.621
Josephine	23	2001.878	106.575	1023.560	46.534	89.505
Jim	25	1791.029	107.632	948.988	45.642	79.545
Jess	27	2063.218	119.883	1051.709	47.163	88.777
Magna	29	927.531	82.982	466.503	17.796	60.971
Lady Advance	31	1258.597	110.969	666.950	28.441	74.908

- ¹Dam, Josephine, Sire, Honorable
²Dam, Ruth McDonald, Sire, Astral King
³Dam, Forgette, Sire, Honorable
⁴Dam, Finette, Sire, Gardiner
⁵Dam, Iona Rex, Sire, Kentucky's Best

*Pounds

TABLE XXXIX

SUMMARY OF AVERAGE DAILY DIGESTIBLE
NUTRIENTS CONSUMED* DURING 1915-1916 TEST

LOT I

NAME	NO.	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
June	11	11.422	1.014	5.884	.230	.758
Martha 2nd	7	13.095	1.087	6.361	.283	.849
Satellite	9	12.002	.904	6.492	.265	.706
Cap	5	26.101	1.524	13.567	.629	1.148
Felibree	1	26.443	1.527	13.698	.631	1.165
Filly Foal ¹	17	12.255	1.172	6.355	.252	.750
Joscelin	15	19.255	1.674	10.282	.453	1.104
Stud Foal ²	21	10.497	.999	5.352	.200	.690
Sport	13	12.671	1.090	6.594	.270	.808
Mena	3	24.626	1.465	12.758	.586	1.067

LOT II

Jill	12	17.124	1.884	7.858	.170	1.452
Ruth McDonald	8	17.124	1.884	7.858	.170	1.452
Iona Rex	10	17.091	1.880	7.844	.170	1.448
Mack	6	29.216	1.458	14.125	.575	1.278
Forgette	2	29.299	1.460	14.191	.577	1.286
Filly Foal ³	18	14.701	1.552	7.197	.255	1.052
Draft Gelding ⁴	16	22.636	2.398	11.026	.336	1.644
Stud Foal ⁵	22	9.182	.961	4.602	.150	.633
Ruth Squirrel	14	17.597	1.921	8.138	.187	1.456
Joseph	4	29.976	1.466	14.100	.583	1.222
Josephine	23	23.832	1.269	12.185	.554	1.066
Jim	25	21.322	1.281	11.298	.543	.947
Jess	27	24.562	1.427	12.520	.561	1.057
Magna	29	11.042	.988	5.554	.212	.726
Lady Advance	31	14.983	1.321	7.940	.339	.892

¹Dam, Josephine, Sire, Honorable²Dam, Ruth McDonald, Sire, Astral King³Dam, Forgette, Sire, Honorable⁴Dam, Finette, Sire, Gardiner⁵Dam, Iona Rex, Sire, Kentucky's Best

*Pounds

Tables XXXVIII and XXXVIX present a summary of the total digestible nutrients and the average daily digestible nutrients in the 1915-1916 trial.

Lot I received silage as a part ration. Lot II was fed no silage.

The horses in this test received on an average the following nutrients per day:-

	Dry Matter	Protein	Carbohydrates	Fat	Ash
Lot I	16.837	1.246	8.734	.380	.905
Lot II	20.395	1.833	9.559	.317	1.293

Josephine, No. 23, Jim, No. 25, Jess, No. 27, Magna, No. 29 and Lady Advance, No. 31, received per day an average of 19.148 pounds of dry matter, 1.257 pounds of protein, 9.895 pounds of fat and .938 pounds of ash.

This table shows that the horses in Lot I received an average of 3.558 pounds of dry matter .587 pounds of protein, .825 pounds of carbohydrates and .388 pounds of ash less than Lot II. Lot I received .063 pounds of fat per day more than Lot II.

TABLE XXXX

SUMMARY OF TOTAL DIGESTIBLE NUTRIENTS CONSUMED *
PER 1,000 POUNDS LIVE WEIGHT DURING 1915-1916 TEST

LOT I

NAME	NO.	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
June	11	934.205	82.906	481.225	18.815	61.981
Martha 2nd	7	922.023	76.514	447.893	19.921	59.791
Satelite	9	900.969	67.860	487.307	22.569	53.029
Cap	5	1723.656	100.658	895.943	41.566	75.784
Felibree	1	1457.505	84.147	754.997	34.798	64.220
Filly Foal ¹	17	1273.311	121.789	659.967	26.000	77.955
Joscelin	15	1402.813	121.926	749.089	32.978	80.454
Stud Foal ²	21	1464.738	139.231	746.731	27.925	96.259
Sport	13	1551.513	133.544	807.391	33.060	98.917
Mena	3	1369.899	81.476	709.712	32.603	59.355

LOT II

Jill	12	1395.189	153.491	640.260	13.801	118.270
Ruth McDonald	8	1147.997	126.296	526.822	11.364	97.316
Iona Rex	10	1339.226	147.323	614.663	13.188	113.492
Mack	6	1905.021	95.433	924.765	37.675	83.652
Forgette	2	1516.060	75.307	732.218	29.778	66.381
Filly Foal ³	18	1476.437	155.863	723.179	22.550	105.675
Draft Gelding ⁴	16	1655.459	166.579	766.075	23.631	114.204
Stud Foal ⁵	22	1548.683	162.153	776.225	25.372	106.707
Ruth Squirrel	14	1885.362	205.824	871.926	20.075	155.955
Josephe	4	1626.674	79.540	758.640	31.641	66.293
Josephine	23	1373.025	73.097	702.030	31.916	61.389
Jim	25	1323.746	79.551	701.395	33.734	58.792
Jess	27	1508.200	87.634	768.793	34.476	64.895
Magna	29	891.000	79.714	448.130	17.105	58.570
Lady Advance	31	1263.652	111.415	669.629	28.558	75.209

¹Dam, Josephine, Sire, Honorable

²Dam, Ruth McDonald, Sire Astral King

³Dam, Forgette, Sire, Honorable

⁴Dam, Finette, Sire, Gardiner

⁵Dam, Iona Rex, Sire, Kentucky's Best

*Pounds

TABLE XXXXI

SUMMARY OF AVERAGE DAILY DIGESTIBLE NUTRIENTS
CONSUMED* PER 1,000 POUNDS LIVE WEIGHT DURING 1915-1916 TEST

LOT I

NAME	NO.	DRY MATTER	PROTEIN	CARBO HYDRATES	FAT	ASH
June	11	11.122	.987	5.729	.224	.738
Martha 2nd	7	10.976	.911	5.332	.237	.712
Satelite	9	10.726	.808	5.801	.269	.631
Cap	5	20.519	1.198	10.666	.495	.902
Felibree	1	17.351	1.002	8.988	.414	.765
Filly Foal ¹	17	15.158	1.450	7.857	.310	.928
Joscelin	15	16.700	1.452	8.918	.393	.958
Stud Foal ²	21	17.437	1.658	8.888	.332	1.146
Sport	13	18.470	1.590	9.612	.394	1.178
Mena	3	16.308	.970	8.449	.388	.707

LOT II

Jill	12	16.609	1.826	7.622	.164	1.408
Ruth McDonald	8	13.667	1.504	6.296	.135	1.159
Iona Rex	10	15.943	1.754	7.306	.157	1.351
Mack	6	22.679	1.136	11.009	.449	.996
Forgette	2	18.048	.897	8.717	.355	.790
Filly Foal ³	18	17.577	1.856	8.609	.268	1.258
Draft Gelding ⁴	16	19.708	1.983	9.120	.281	1.360
Stud Foal ⁵	22	18.437	1.930	9.241	.302	1.271
Ruth Squirrel	14	22.445	2.450	10.380	.239	1.857
Josephe	4	19.365	.947	9.031	.377	.789
Josephine	23	16.346	.870	8.258	.380	.731
Jim	25	15.759	.947	8.350	.402	.700
Jess	27	17.955	1.043	9.152	.410	.772
Magna	29	10.607	.949	5.335	.204	.697
Lady Advance	31	15.044	1.326	7.972	.340	.895

¹Dam, Josephine, Sire, Honorable

²Dam, Ruth McDonald, Sire, Astral King

³Dam, Forgette, Sire, Honorable

⁴Dam, Finette, Sire, Gardiner

⁵Dam, Iona Rex, Sire, Kentucky's Best

*Pounds

Tables XXXX and XXXXI present a summary of the total and the average daily digestible nutrients consumed per thousand pounds live weight by the horses in the 1915-1916 test.

Lot I received silage as a part ration. Lot II was fed no silage.

The horses in this test received daily the following nutrients per thousand pounds live weight:

	Dry Matter	Protein	Carbohydrates	Fat	Ash
Lot I	15.477	1.203	8.024	.344	.867
Lot II	18.448	1.628	8.733	.273	1.224

Josephine, No. 23, Jim, No. 25, Jess, No. 27, Magna, No. 29 and Lady Advance, No. 31, received daily, per thousand pounds live weight an average of 15.142 pounds dry matter, .425 pounds of protein, 7.813 pounds carbohydrates, .347 pounds of fat and .759 pounds of ash.

This table shows that the horses in Lot I received a daily average per head, per thousand pounds live weight 2.971 pounds dry matter, .54 pounds of protein, .709 pounds of carbohydrates and .357 pounds of ash less than Lot II.

Lot I received .071 pounds of fat more per day than Lot II.

SUMMARY OF THE 1914-1915 AND THE 1915-1916 TESTS

GROUP A Mature idle horses and mules

b. Open mares

During the 1914-1915 test there were no mares available in this division. Two mares were available during the 1915-1916 test. For tables and discussion see pages 97-99.

c. Pregnant mares

During the 1914-1915 test two mares were available in this division. Four mares were available during the 1915-1916 test. There were three mares in each lot. Lot I received silage as a part ration, Lot II received no silage.

TABLE XXXXII

*AVERAGE FEED CONSUMED** AND GAIN OR LOSS IN WEIGHT

	¹ GRAIN	² HAY	SILAGE	GAIN
Lot I	350.0	481.17	1131.92	97.0
Lot II	334.67	1096.25		104.0

AVERAGE DAILY FEED CONSUMED**

	¹ GRAIN	² HAY	SILAGE
Lot I	4.17	6.42	13.81
Lot II	3.98	13.11	

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**

	DRY MATTER	PROTEIN	CARBOHYDRATES	FAT	ASH
Lot I	1203.941	100.119	593.657	25.673	75.994
Lot II	1324.098	145.522	609.057	13.164	109.529

AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED**

Lot I	14.015	1.192	7.067	.294	.904
Lot II	15.763	1.733	7.250	.157	1.304

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**
PER 1,000 POUNDS LIVE WEIGHT

Lot I	986.029	81.998	496.206	21.026	62.240
Lot II	1138.519	125.127	523.695	11.319	94.178

AVERAGE DAILY DIGESTIBLE NUTRIENTS**
CONSUMED PER 1,000 POUNDS LIVE WEIGHT

Lot I	11.739	.976	5.907	.250	.741
Lot II	13.554	1.489	6.234	.135	1.121

*For a 12 week feeding period

¹Corn 2 parts, Oats 2 parts, Bran 1 part, by weight²Alfalfa hay

**Pounds

Table XXXXII presents a summary of the data for Group A - c, pregnant idle mares that were fed in both tests. There were three horses in each lot. Lot I was fed silage as a part ration. Lot II received no silage.

The table shows that Lot I received an average of .19 pounds of grain more per day than Lot II. An average of 6.69 pounds of hay was consumed by Lot I less than that consumed by Lot II. Lot I consumed per day an average of 13.81 pounds of silage. Lot II received daily 1.748 pounds of dry matter, .541 pounds of protein, .183 pounds of carbohydrates, and .40 pounds of ash per day more than Lot I. Lot I was fed an average of .137 pounds of fat per day more than Lot II.

When reduced to a thousand pound basis, the table shows that Lot II consumed daily 1.815 pounds of dry matter, .513 pounds of protein, .327 pounds of carbohydrates and .380 pounds of ash more than Lot I. Lot I received .115 pounds of fat per day more than Lot II.

Lot I gained an average of 97 pounds and Lot II gained an average of 104 pounds.

GROUP B Mature horses and mules doing average winter farm work.

a. Mules

During the 1914-1915 test two mules were available in this division. There were no mules available during the 1915-1916

test.

For tables and discussion see pages 47-50

b. Geldings

Two geldings were available during each test.

Lot I received silage as a part ration.

Lot II received no silage.

TABLE XXXXIII

AVERAGE FEED CONSUMED AND GAIN OR LOSS IN WEIGHT**

	¹ GRAIN	² HAY	SILAGE	LOSS
Lot I	1151.25	807.75	1034	34
Lot II	1235.50	1374.75		41

AVERAGE DAILY FEED CONSUMED**

Lot I	13.726	9.612	12.308
Lot II	14.706	16.353	

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**

	DRY MATTER	PROTEIN	CARBOHYDRATES	FAT	ASH
Lot I	2175.059	128.583	1108.330	52.403	96.645
Lot II	2397.164	186.476	1144.007	46.325	107.199

AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED**

Lot I	26.894	1.531	13.195	.624	1.151
Lot II	28.538	2.214	13.620	.552	1.277

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**
PER 1,000 POUNDS LIVE WEIGHT

Lot I	1660.350	98.155	846.054	40.002	73.775
Lot II	1843.972	143.212	880.005	35.635	82.461

AVERAGE DAILY DIGESTIBLE NUTRIENTS
**CONSUMED PER 1,000 POUNDS LIVE WEIGHT

Lot I	19.766	1.169	10.072	.476	.878
Lot II	21.952	1.705	10.475	.424	.982

*For a 12 week feeding period

¹Corn 2 parts, oats 2 parts, bran 1 part, by weight²Timothy hay

**Pounds

Table XXXXIII presents a summary of the data for Group B - b, mature draft geldings doing average winter farm work, that were fed in both tests.

There were two horses in each lot. Lot I was fed silage as a part ration. Lot II received no silage.

Lot I consumed daily an average of .98 pounds of grain, 6.741 pounds of hay less than Lot II. Lot I was fed an average of 12.308 pounds of silage per day.

The table of digestible nutrients consumed shows that Lot II consumed daily 2.644 pounds of dry matter, .683 pounds of protein, .425 pounds of carbohydrates and .126 pounds of ash more than Lot I. Lot I received daily .072 pounds of fat more than Lot II.

Per thousand pounds live weight, Lot I consumed 2.186 pounds of dry matter, .536 pounds of protein, .403 pounds of carbohydrates and .104 pounds of ash per day less than Lot II.

Lot I received .052 pounds of fat daily more than Lot II.

Lot I lost an average of 34 pounds and Lot II lost 41 pounds.

c. Pregnant mares

Two pregnant mares were available in each test in this division.

Lot I received silage as a part ration.

Lot II received no silage.

TABLE XXXXIV

*AVERAGE FEED CONSUMED** AND GAIN OR LOSS IN WEIGHT**

	¹ GRAIN	² HAY	SILAGE	GAIN
Lot I	1202.5	869.75	912.75	19
Lot II	1252.5	1387.5		42

AVERAGE DAILY FEED CONSUMED**

Lot I	14.313	10.353	10.861
Lot II	14.910	16.513	

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**

	DRY MATTER	PROTEIN	CARBOHYDRATES	FAT	ASH
Lot I	2231.633	131.877	1130.485	52.307	99.076
Lot II	2425.099	126.619	1157.626	46.884	108.412

AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED**

Lot I	26.567	1.570	13.458	.623	1.180
Lot II	28.829	1.505	13.781	.558	1.291

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**
PER 1,000 POUNDS LIVE WEIGHT

Lot I	1430.534	84.537	724.670	33.526	63.703
Lot II	1469.675	81.515	701.592	28.415	65.704

**AVERAGE DAILY DIGESTIBLE NUTRIENTS
CONSUMED PER 1,000 POUNDS LIVE WEIGHT

Lot I	17.030	1.006	8.627	.399	.758
Lot II	17.496	.970	8.352	.338	.782

*For 12 week feeding period

¹Corn 2 parts, oats 2 parts, bran 1 part, by weight²Timothy hay

**Pounds

Table XXXXIV presents a summary of the data for Group B-c, pregnant mares performing average winter farm work, that were fed in both tests.

There were two horses in each lot. Lot I received silage as a part ration. Lot II received no silage.

Lot I consumed daily an average of .597 pounds of grain and 6.16 pounds of hay less than Lot II. Lot I was fed an average of 10.861 pounds of silage daily.

In amount of digestible nutrients received, Lot I was fed daily .065 pounds of protein and .065 pounds of fat more than Lot II. Lot II consumed 2.262 pounds of dry matter, .323 pounds of carbohydrates and .111 pounds of ash daily more than Lot I.

When reduced to a thousand pound basis, Lot I received an average per day of .036 pounds of protein, .275 pounds of carbohydrates and .061 pounds of fat more than Lot II. Lot II consumed daily .466 pounds of dry matter and .024 pounds of ash more than Lot I.

Lot I made an average gain of 19 pounds. Lot II made an average gain of 42 pounds.

GROUP C Growing horses and mules

b - 1 Draft foals

Two draft foals were available in each test in this division.

Lot I received silage as a part ration.

Lot II received no silage.

TABLE XXXXV

*AVERAGE FEED CONSUMED** AND GAIN OR LOSS IN WEIGHT**

	¹ GRAIN	² HAY	SILAGE	GAIN
Lot I	425	391.5	377.65	79
Lot II	461	830.63		143

AVERAGE DAILY FEED CONSUMED**

Lot I	5.06	4.66	4.499
Lot II	5.49	9.884	

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**

	DRY MATTER	PROTEIN	CARBOHYDRATES	FAT	ASH
Lot I	891.875	80.103	456.152	18.137	55.757
Lot II	1193.296	128.311	569.170	15.281	88.584

AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED**

Lot I	10.617	1.013	5.430	.216	.664
Lot II	14.206	1.528	6.776	.197	1.055

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**
PER 1,000 POUNDS LIVE WEIGHT

Lot I	1087.652	97.686	556.283	22.118	67.996
Lot II	1449.934	115.906	691.579	18.567	107.635

** AVERAGE DAILY DIGESTIBLE NUTRIENTS
CONSUMED PER 1,000 POUNDS LIVE WEIGHT

Lot I	12.948	1.163	6.622	.263	.809
Lot II	17.261	1.380	8.233	.221	1.281

*For 12 week feeding period

¹Corn 2 parts, oats 2 parts, bran 1 part, by weight²Alfalfa hay

**Pounds

Table XXXXV presents a summary of the data for Group C-b-1, growing draft foals that were fed in both tests.

There were two foals in each lot. Lot I was fed silage as a part ration. Lot II received no silage.

The table shows that Lot I was fed a daily average of .43 pounds of grain and 5.224 pounds of hay less than Lot II. Lot I received per day an average of 4.499 pounds of silage.

Lot II consumed daily an average of 3.589 pounds of dry matter, .515 pounds of protein, 1.346 pounds of carbohydrates and .391 pounds of ash more than Lot I. Lot I received a daily average of .019 pounds of fat more than Lot II.

The table of digestible nutrients per 1,000 pounds live weight shows that Lot II received an average of 4.313 pounds of dry matter, .217 pounds of protein, 1.611 pounds of carbohydrates and .472 pounds of ash per day more than Lot I. Lot I was fed a daily average of .042 pounds of fat per day more than Lot II.

Lot I gained an average of 79 pounds. Lot II gained an average of 143 pounds.

b - 2 Draft yearlings

During the 1914-1915 test there were no draft yearlings available in this division. Two draft yearlings were available during the 1915-1916 test.

For the tables and discussion see pages 121-123.

c - 1 Foals of light breeds

There were two light foals available in each test in this division.

Lot I received silage as a part ration.

Lot II received no silage.

TABLE XXXXVI

*AVERAGE FEED CONSUMED**AND GAIN OR LOSS IN WEIGHT**

	¹ GRAIN	² HAY	SILAGE	GAIN
Lot I	371.88	404.75	424.88	54
Lot II	375.5	505.13		72

AVERAGE DAILY FEED CONSUMED**

Lot I	4.42	4.818	5.506
Lot II	4.421	6.009	

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**

	DRY MATTER	PROTEIN	CARBOHYDRATES	FAT	ASH
Lot I	872.056	82.969	442.476	17.230	56.094
Lot II	807.242	86.310	394.547	11.606	56.702

AVERAGE DAILY DIGESTIBLE NUTRIENTS CONSUMED**

Lot I	10.382	.989	5.268	.205	.668
Lot II	9.611	1.028	4.697	.136	.675

*AVERAGE DIGESTIBLE NUTRIENTS CONSUMED**
PER 1,000 POUNDS LIVE WEIGHT

Lot I	1495.808	142.314	758.964	29.554	96.216
Lot II	1543.484	165.029	754.201	22.191	108.417

AVERAGE DAILY DIGESTIBLE NUTRIENTS
**CONSUMED PER 1,000 POUNDS LIVE WEIGHT

Lot I	17.807	1.694	9.035	.352	1.145
Lot II	18.375	1.965	8.979	.264	1.291

*For 12 week feeding period

¹Corn 2 parts, oats 2 parts, bran 1 part, by weight²Alfalfa

**Pounds

Table XXXXVI presents a summary of the data for Group C-1, growing light foals that were fed in the test.

There were two horses in each lot. Lot I received silage as a part ration, Lot II received no silage.

These lots were fed practically the same amounts of grain per day. Lot I was fed an average of .191 pounds of hay less per day than Lot II. Lot I received an average of 5.506 pounds of silage.

The table of digestible nutrients shows that Lot II received an average of .039 pounds of protein and .007 pounds of ash daily more than Lot I. Lot I consumed per day an average of .771 pounds of dry matter, .571 pounds of carbohydrates and .069 pounds of fat more than Lot II.

When reduced to a thousand pound basis, Lot I received a daily average of .568 pounds of dry matter, .271 pounds of protein and .146 pounds of ash per day less than Lot II. Lot I consumed an average per day of .056 pounds of carbohydrates and .088 pounds of fat more than Lot II.

Lot I gained an average of 54 pounds. Lot II gained an average of 72 pounds.

c - 2 Yearlings of light breeds

During the 1914-1915 test there were no yearlings available in this division. For the tables and discussion of Pepper, No. 15 a two year old and Lady Advance, No. 16,

a yearling, see pages 71 - 74.

Two light yearlings were available during the 1915-1916 test.

For the tables and discussion see pages 127-129.

GROUP D Immature horses and mules performing average winter farm work.

b. Open mares

During the 1914-1915 test there were two mares available in this division. There were no mares available during the 1915-1916 test. For the discussion see page 74.

c. Pregnant mares

During the 1914-1915 test there were no mares available in this division. Two mares were available during the 1915-1916 test.

For the tables and discussion see pages 130-133.

GROUP E Immature idle horses and mules

c. Pregnant mares

During the 1914-1915 test there were two mares available in this division. There were no mares available during the 1915-1916 test.

For the tables and discussion see pages 75-78.

SUMMARY

Corn silage of good quality was fed to horses of various ages under varying conditions during the two tests.

One mature mule performing average winter farm work was fed silage during the first test.

Large quantities of silage were not eaten at first, but when the horses became accustomed to it larger amounts were consumed.

Silage was consumed in amounts of from an average of 3.997 pounds daily in case of Filly Foal, No. 17 during 1915-1916 to an average of 15.908 pounds in case of idle pregnant mare, Satelite, No. 9 during the same test.

It should not be concluded that this is the maximum amount of silage that can be fed.

At the close of the tests twelve "silage fed horses" were in better thrift than those fed no silage. In three cases there was no noticeable difference. In four cases the "silage fed horses" indicated slightly less thrift than those receiving only grain and hay. In the latter case two of the horses fed silage lacked thrift at the beginning of the test.

An average of the digestible nutrients consumed daily per thousand pounds live weight for both tests show that the "silage fed horses" received daily less dry matter, protein, carbohydrates and ash than the horses fed no silage and that they received slightly more fat.

One open idle mare was fed an average daily ration of 4 pounds grain, 5 pounds of alfalfa hay and 8.833 pounds of silage during the 1915-1916 test. A check lot was fed daily 4 pounds grain and 14.5 pounds of alfalfa hay. The silage fed mare lost 18 pounds and the check lot gained 18 pounds during the test. There was no noticeable difference in the condition or thrift of these mares at the close of the test.

Three idle pregnant mares were fed an average daily ration of 4.17 pounds grain, 6.42 pounds alfalfa hay and 13.81 pounds of silage during the feeding period. Three mares, fed as a check lot, consumed daily 3.98 pounds grain and 13.11 pounds of alfalfa hay. The silage fed mares gained an average of 97 pounds. The mares in the check lot made an average gain of 104 pounds. At the close of the test two of the "silage fed mares" were in better thrift than those not fed silage. The thrift of one of the silage fed mares was slightly inferior to the thrift of the check lot.

The pregnant mares fed silage produced foals that were as large, straight and active as the pregnant mares fed only grain and alfalfa hay.

One mule performing average winter farm work was fed an average daily ration of 6.22 pounds grain, 8.12 pounds of timothy hay and 8.05 pounds silage during the 1914-1915 test. The mule fed as a check consumed daily 7.76 pounds grain

and 12.31 pounds of timothy hay. The silage fed mule lost 45 pounds during the test. The mule fed no silage lost 5 pounds. At the close of the test the silage fed mule was in much better thrift than the other mule as was indicated by the condition of the hair and skin.

Two geldings performing average winter farm work were fed an average daily ration of 13.726 pounds grain, 9.17 pounds timothy hay and 12.308 pounds of silage. Two geldings fed as a check consumed a daily average of 14.706 pounds grain and 16.350 pounds of timothy hay. The silage fed geldings lost an average of 34 pounds in weight. The geldings fed as a check lot lost 41 pounds in weight. Both silage fed geldings were in better thrift at the close of the test than the geldings fed only grain and timothy hay.

Two mature pregnant mares doing average winter farm work were fed an average daily ration of 14.313 pounds grain, 10.353 pounds of timothy hay and 10.861 pounds of silage. Two mature pregnant mares fed as a check consumed a daily average of 14.91 pounds of grain and 16.513 pounds of timothy hay. The mares fed silage made an average gain of 19 pounds and the mares fed no silage gained an average of 42 pounds during the feeding period. The silage fed mares were in better thrift at the close of the test than the mares fed no silage. They produced foals that were as large, strong, straight and active as were produced by the mares fed only grain and timothy hay.

Two draft foals were fed an average daily ration of 5.06 pounds grain, 4.66 pounds alfalfa hay and 4.499 pounds of silage. Two foals fed as a check lot consumed a daily average of 5.49 pounds grain and 9.884 pounds alfalfa hay. The foals fed silage made an average gain of 79 pounds and the foals fed only grain and hay gained an average of 143 pounds during the test. The silage fed foals were in slightly better thrift at the close of the test.

One yearling draft filly was fed a daily ration of 10 pounds grain, 5.667 pounds of alfalfa hay and 13.604 pounds of silage. One yearling gelding fed as a check received daily an average of 10 pounds grain and 14.5 pounds alfalfa hay. The "silage fed yearling" gained 50 pounds and the gelding fed only grain and alfalfa gained 92 pounds during the test. At the close of the test the yearling fed silage was in better thrift than the gelding fed no silage.

Two light foals were fed an average daily ration of 4.42 pounds grain, 4.818 pounds of alfalfa hay and 5.506 pounds of silage. The check lot were fed daily 4.421 pounds grain and 6.009 pounds of alfalfa hay. The foals receiving silage made an average gain of 54 pounds and the two foals fed only grain and alfalfa made an average gain of 72 pounds during the test. In one case the silage fed foal indicated better thrift and in the other case the foal fed no silage was in better thrift at the close of the test.

One saddle yearling was fed an average daily ration of 4.667 pounds grain, 4.9 pounds alfalfa hay and 10.795 pounds of silage. One yearling fed as a check lot consumed daily 4.667 pounds of grain and 14.315 pounds of alfalfa hay during the second trial. The yearling fed only grain and alfalfa hay was in slightly better thrift at the close of the test.

One light two year old was fed an average daily ration of 2.07 pounds grain, 5.88 pounds alfalfa hay and 10.27 pounds silage. The check lot, a yearling, was fed a daily ration of 4 pounds grain and 8.86 pounds of alfalfa hay. The two year old fed silage gained 39 pounds during the test and the yearling fed as a check gained 35 pounds. The silage fed two year old was in better thrift at the close of the test than the yearling fed only grain and alfalfa hay.

One immature idle pregnant mare was fed an average daily ration of 3.93 pounds grain, 5.18 pounds alfalfa hay, and 9.28 pounds of silage. One immature idle pregnant mare fed as a check received daily 4 pounds grain and 14.42 pounds alfalfa hay. The mare fed silage gained 73 pounds during the test and the check fed no silage gained 96 pounds. The silage fed mare was in much better thrift at the close of the test.

One immature open mare performing average winter farm work refused the silage at first. After the quantity of grain and hay fed was reduced she ate the silage. She was consuming about 8 pounds of silage per day when she developed a

case of destemper and indigestion and had to be taken off the experiment.

One immature pregnant mare performing average winter farm work was fed an average ration of 14.286 pounds grain, 8.637 pounds of timothy hay and 9.896 pounds of silage. One immature pregnant mare performing average winter farm work fed as a check lot received daily 15.131 pounds of grain, and 17.321 pounds of alfalfa hay. The silage fed mare gained 40 pounds and the check fed only grain and hay gained 3 pounds during the feeding period. The hair and skin of the silage fed mare indicated that she was in better thrift than the mare fed no silage. The mare fed silage dropped a large, active foal soon after the test closed.

The following are the rations fed and the gain or loss in weight of the horses fed with no check lot during the 1915-1916 test:

The mature idle open mare Josephine, No. 23 was fed an average daily ration of 11.427 pounds of grain, 9.238 pounds of timothy hay and 13.402 pounds of silage. This mare lost 5 pounds during the test.

The mature idle gelding Jim, No. 25 was fed an average daily ration of 11.489 pounds grain, 10 pounds of timothy hay and 15.136 pounds of silage. This gelding did not gain or lose in weight during the test.

The open mare Jess, No. 27, performing delivery work, was fed an average daily ration of 14.405 pounds grain, 9.900

pounds of timothy hay and 6.098 pounds of silage. This mare lost 50 pounds in weight during the test.

The mature idle open mare Magna, No. 29 was fed an average daily ration of 4 pounds of grain, 5 pounds of alfalfa hay and 7.205 pounds of silage. This mare lost 16 pounds during the test.

The immature two year old filly Lady Advance, No. 31 was fed an average daily ration of 7.333 pounds grain, 5 pounds of alfalfa hay and 10.262 pounds of silage. This mare lost 12 pounds during the test. She was driven some.

These horses were all in good thrifty condition at the close of the feeding period.

The mature idle pregnant mare Satelite, No. 9 and the mature idle gelding Jim, No. 25 were fed only grain and silage during the last five weeks of the 1915-1916 test.

CONCLUSION

This was an initial effort to feed silage as a part ration to horses and mules of various ages and under varying conditions at the Missouri Experiment Station.

The data in the 1915-1916 tests are not sufficient to make possible conclusions for each of the groups.

Corn silage of good quality, made from comparatively mature corn, properly put into the silo, containing no moldy, frozen or rotten parts may be fed in limited quantities to horses of various ages under varying conditions.

SUGGESTIONS FOR FUTURE INVESTIGATIONS

1. Definite conclusions concerning the most satisfactory combination of corn silage and other feeds for horses and mules of various ages and under varying conditions are not possible until more data and information are available for the various groups here outlined. Further data, therefore, should be secured for each class of horses.
2. The data from the two trials presented indicate that the horses were being maintained in medium growing, working and breeding condition. No effort was made to fatten the horses. If possible, further data should be secured to determine whether relatively more corn silage may be utilized in the ration for production of fat in mature horses and mules, and to procure more rapid growth and development in growing horses and mules.
3. Molds and bacterial growths frequently found in silage and the effect of each upon horses and mules should be studied. If it is found that any or all of these cause sickness or other undesirable results, means for counteracting these effects should be sought..
4. The problem of using silage in the ration for fattening horses and mules for market was not included in the outline. Data and information should be procured on this important phase of horse production.
5. The most noticeable result observed in the two trials

discussed was the more healthy and thrifty condition of the hair and skin in the "silage fed horses."

"¹This succulent feed tends to keep the bowels normal, the body tissues sappy, the skin pliant and the coat glossy, all of which mark the animals as in condition to make the most from their feed."

6. Further efforts should be made to discover the maximum amount of silage that can be safely and economically fed to horses and mules of various ages and under varying conditions.
7. A study of the costs of standard rations containing different amounts of silage should be made.
8. Data should be secured on the possibilities of feeding silage as a sole roughage with grain to mature idle horses and any other groups of horses not requiring feeds in concentrated form.
9. A study should be made of the possibility of maintaining idle horses and mules on a ration of silage and hay.
10. A study should be made of the effect of silage as a part ration during the winter on the ability of horses to pasture the following summer.
11. Observations should be made of the excretion, appetite, spirit and ability to perform work of horses and mules fed

¹Henry and Morrison, Feeds and Feeding, 1915 edition, p.259

silage as a part ration. In case of brood mares a study should be made of the effect of silage in the ration on the development of the fetus and the growth of the foal when suckling its dam.

12. The coefficient of digestibility should be determined for silage when fed to horses and any other means of judging results should be studied.

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UNIVERSITY OF MISSOURI
COLUMBIA

COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF VETERINARY SCIENCE

May 23, 1916.

Dean Walter Miller,
Chairman, Graduate Committee.

Dear Dean Miller:

The dissertation of Mr. Elmer Hughes on "Silage as a Part Ration for Horses and Mules of Various Ages and under Varying Conditions" is in my opinion worthy of acceptance, in partial fulfillment of the requirements for the degree of Master of Arts.

The dissertation is based, in part, on an incompleated feeding experiment in a field of research in which but little had previously been done; and in the nature of the case considerable work must yet be done before the definite results sought for are obtained. But the excellent presentation of the plan and object of the research with the tabulations, illustrations, and analysis of the data showing present status of the research, I think quite fully meet the requirements. I therefore join with Prof. E. A. Trowbridge in recommending the acceptance of the dissertation.

Very truly,

J. W. Connaway.

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