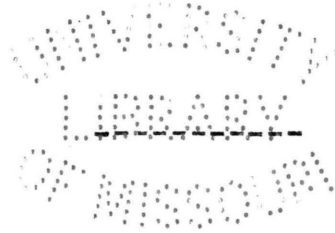WORK STOCK MANAGEMENT

by

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SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in the

GRADUATE SCHOOL

OF THE

Approved,
O. R. Johnson

University of Missouri

1913

WORK STOCK MANAGEMENT

The object of this investigation is to arrive at some
conclusion or determine, if possible, the most satisfactory means
or methods of management of the work stock or work animals
on the farms in actual operation.

The data for this investigation was obtained by sending
circular letters to farmers thruout the state and by feeding
records and diaries kept by several farmers on farms in actual
operation and actual practice. The circular letters (Plate 1-2)
were sent to about 1800 farmers who were good fair representatives
of the general farmer of the state. Of the 1800 letters sent
out about 500 returned and of these 296 were selected for use
here. The ones selected were the ones most complete, most legible
and filled out in clear, concise manner. The feeding records and
diaries include figures obtained, in cooperation with the Farm
Management Department of the University of Missouri, by several
farmers on a fairly large number of animals, and these figures
give us absolute facts in this regard, whereas the former are
more or less correct, varying with the degree of accuracy of
the farmers estimates.

In summarizing this data the whole number of cases was
divided into four groups. The first includes all cases where

Plate I ....   1 a

UNIVERSITY OF MISSOURI—COLLEGE OF AGRICULTURE

FARM MANAGEMENT DEPARTMENT

IN CO-OPERATION WITH U. S. DEPARTMENT OF AGRICULTURE

OFFICE OF FARM MANAGEMENT

Columbia, Mo., Feb. 20th, 1913

Dear Sir:--

We are making a detailed study of the different methods of work stock management in an effort to determine what are the most successful systems in practice on our farms to-day, and knowing of your interest in and your desire to aid any movement which has for its object the bringing before the farmers of our state the practices of the most successful men, we are asking that you kindly fill in the following blanks and return to us in the enclosed envelope, which requires NO postage. This information will be considered confidential. Your name will in no way be associated with it when the results appear in print.

Thanking you for any help you may be able to give us, I remain,

Very truly yours,

O. R. JOHNSON,

Farm Management Department.

J

My name is...

Postoffice...County...I live

.................miles from town. My farm is *bottom land—up land—rough—level—rolling. I own..................acres.

I rent...................acres. I operate a total of...................acres. The land I own will bring $...........................per

acre on the market. I have about $...........................worth of buildings, fences, etc., on my farm. I can

cultivate...........................acres of the land I operate. I have...........................acres that I keep in grass. On the

average...........................acres of my pasture would support a mature steer all season. I *have—have not—

practiced rotating crops for.................years. My rotation is...

....

My crop acreages, yields and sales last season were (give all field crops of importance).

CROP	CORN	OATS	WHEAT				
Acres							
Yield per A							
Total							
Sales	$	$	$	$	$	$	$

A list of all my horse and mule stock follows:

	NUMBER	AVERAGE WEIGHT	VALUE
Mares over 2 and under 7			
Mares over 7 years			
Geldings over 2 and under 7			
Geldings over 7			
Mules over 2 and under 7			
Mules over 7			

*Cross out all but the word that fits your condition.

Plate 2   1 a

The mares given above are mostly of..breed, or grade. The geldings are of..breed (draft, coach, etc.). I have......................horses under two years. They are worth about $......................per head. I keep about......................mules under two years. They are worth about $......................per head. I keep about......................dairy cattle, worth $......................(total value). About......................head of beef cattle, worth $......................(total value). About......................head of hogs worth $......................(total value). About......................head of sheep, worth $......................(total value). ....stallions, worth $......................(total value). ....of jacks and......................jennets, worth about $......................(total value). I keep......................brood mares exclusively for breeding. ....of my mares kept for work raise colts. I raise from these mares about......................colts per year. I raise......................fall colts and......................spring colts. ....of these are horse colts and......................are mule colts. I like (spring or fall) colts best because..

I raise about......................per cent colts per year (the number raised compared to number of mares bred). I sell on the average about......................colts under two years of age per year. I find it easier to sell young —*mule—horse—colts than—*mule—horse—colts. The mule colts are usually......................months old when I sell them and horse colts......................months. I receive about $......................for the mule and $...................... for the horse colts. I pay on the average $......................service fee for mule colts and $......................for horse colts. I sell......................young horses and......................mules over two years usually at $...................... for horses and $......................for mules. The broken young horses usually bring $......................more than the unbroken ones at the same age and broken mules $......................more than the unbroken ones at the same age. I usually sell mature horses at......................years and mules at......................years. I usually get $...................... for the horses and $......................for the mules. I buy young horses at......................years, costing $...................... per head and young mules at......................years, costing $......................per head. I buy mature horses at...................... years, costing $......................per head. I buy mature mules at......................years, costing $......................per head. I *do—do not—keep all my work stock the year around. I sell......................head in......................(month)

and replace them in_____(month).   I use my work stock in summer for_____

_____

_____(give other special kinds of work) in addition to the caring for field crops.   I keep about

—*¼—½—¾—all—of my work stock busy in winter.   I use them at this time for_____

_____

It costs me about $_____a year to keep brood mares. $_____to keep other mares and

and geldings; and $_____to keep mules.   Grading for efficiency and counting the average mature

gelding at 100, brood mares would grade_____points; mules_____points and young work stock_____points.

REMARKS: _____

_____

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the farmer operates less than 120 acres. Group II includes all those between 120 and 220 acres. Group III includes those between 220 and 320 and group IV comprises all those of 320 acres and over. In the following the various cases will be spoken of as Group I, II etc.

There are several facts that bear more or less directly or indirectly on this problem and some of the most important ones will be considered and given in the following tables.

Size of farm and distance from town.

	Size of farm.		Distance from town.	
	No.of farms	Av. size	No. of farms	Av. dis.
Group I	24	104.83	25	3.29
Group II	91	153.60	101	4.87
Group III	62	244.38	64	4.59
Group IV	94	657.13	102	4.53

The above table shows that the smaller farms are nearest to town and this, one would imagine to be the case, but there seems to be no relation of size of farm to distance from town after we get above the smallest group, or 120 acres.

It is interesting to note the relative number of small farms reporting in comparkison to the number of largest ones. This fact, it seems, goes to show that the farmers on the larger areas are the most up-to-date and have a better idea of social and agricultural improvements as shown by his willingness to cooperate in this one particular investigation.

Amount operated and percent tilled

2	Amount operated		Percent tilled	
	No. reported	Av.	No. rept'd	Av.
Group I	26	86.37	22	75.73
Group II	102	161.5	94	71.16
Group III	65	259.11	62	69.12
Group IV	103	670.57	101	60.79

The above table shows the relative size of farms
in the various groups and shows the relative amount of land
per. farm that is actually tilled or worked each year. The
figures show that the smaller farms have a greater percent of their
area tilled than the larger ones but this difference is not as
large as one might immagine.

The high average for the size of farms in group IV is
due to the fact that there were a few extremely large ones. One
farm had an area of 10000 acres operated

Percent practicing rotation and length of time practiced.

3	% practicing rotation.		Av. years practiced.	
	No. rept'd.	Av. %	No.rep'td	Av.years
Group I	23	100	22	7.22
Group II	88	79.54	63	9.09
Group III	60	90	54	10.71
Group IV	97	91.75	78	12.46

The above table goes to show us, again, that it is the larger farmer that is the most progressive and is the one that is making a greater effort to adapt himself to the advance methods of farming. It will be seen that, aside from group I where there were comparitively few cases reported and in all cases they reported as having practiced rotation and the percent, therefore, was 100, the percent gradually increased with increase in size of farm and there is a gradual and also a perceptible increase in the average number of years they have practiced rotation from the smaller farms, which report an average of 7.22 years to 12.46 years on the larger farms.

Average yield per acre.

4	Corn		Oats		Wheat		Hay	
	No. report-ing.	Av. yield. per A.	No. report-ing.	Av. yield per A.	No. report-ing	Av. yield per .	No. rep't ing	Av. y'ld in T
Group I	23	44.8	12	30.08	13	16.2	8	.94
Group II	95	40.55	63	42.41	54	14.4	26	1.11
Group III	63	41.92	44	37.41	42	16.4	22	1.08
Guoup IV	97	43.93	73	39.05	70	17.16	34	1.71

The above table is very interesting, in that it serves to ~~prove~~ substantiate Prof. G. F. Warren's[*] results, and it also disproves the common and erroneous idea that the crop yields are larger on the smaller farms and that the yields decrease with the increase

[*]Cornell Bulletin No. 295. pp 425.

in size of farm. We see in the case of corn there is the greatest
yield per. acre in Group I, then a gradual increase in Group
III and IV till the latter is nearly as great as in Group I.
In the case of oats there seems to be no direct relation but
we see a noticeably low yield in Group I and for the rest the
yield seems to be quite uniform. Aside from the slight variation
in Group I the wheat yield actually increases with the increase
in area, and the same holds true of hay except the very slight
decrease of Group III over II.

There is not, in all cases, an increase in yields with
the increase in area but the general tendency is that way and
this fact seems of great importance to the farmer, for it does
not coincide with the popular opinion, that we should "Intensify"
our farm operations and work smaller areas. A goodly number of
the farmers reporting this data have come to realize the im-
portance of the above facts and are increasing their area operated
by renting land from neighboring farmers. The general practice
also seems to be for the farmers already on the larger farms to
rent outside land more than the farmers of smaller areas altho
the data does not show this absolutely.

The above facts and data are given because they are of
considerable importance to our final conclusions in this work
tho they, themselves, possibly are not, primarily, work stock
problems.

The points of greatest importance in this investigation are those bearing directly on the problem and the question of work stock as to number, quality, value etc, are here to be considered.

Average number,weight and value of mares between 2-7 years

5	No. rept'd.	Av. no. per. farm	Av. wt. per. head.	Av. value per. head.(in $)
Group I	23	1.7	1154	177.63
Group II	84	2.38	1156	170.81
Group III	51	2.61	1190	183.34
Group IV	89	3.61	1272	180.33

This table shows a gradual increase in weight of the animals on the larger farms and also a tendency toward an increase in value .

Average number, weight and value of mares over 7 years.

6	No. rept'd.	Av. no. per. farm.	Av. wt. per. head.	Av. value per. head.
Group I.	17	1.76	1253	133.33
Group II	84	2.19	1189	147.59
Group III	51	2.41	1213	150.08
Group IV	78	2.56	1223	155.29

The same facts are seen here as in the preceeding table; namely,that the greater the size of farm the heavier the mares and the greater the value of them.

Av. weight, number and value of geldings between 2-7 years

7	No. rept'd	Av. no. per farm.	Av.wt. per. head.	Av. value per. head. (in $)
Group I	11	1.45	1085	142.85
Group II	59	1.95	1157	149.11
Group III	43	1.86	1180	149.07
Group IV	71	2.99	1180	147.01

Average number,weight and value of geldings over 7 years.

8	No. rept'd	Av. no. per. farm	Av. wt. per. head.	Av. value per. haed. (In $)
Group I	8	1.11	1050	117.77
Group II	49	1.71	1159	127.56
Group III	27	1.77	1168	120.11
Group IV	55	2.28	1148	132.78

These figures tend to show that on the larger farm larger animals are to be found. In both of the preceeding tables the geldings of group I are perceptibly smaller and considerably cheaper than in any of the other groups. The average number of this class of animals per. farm is comparatively small as well as the number reporting compared to the total number of farmers included in each group. All conclusions drawn from the preceeding tables as regards mares is corroborated by this data on geldings.

Average number, weight and value of mules between 2-7 years

9	No. reported	Av. no. per. farm.	Av. wt. per. head.	Av. value per. head. (in $)
Group I	11	2.04	995	161.95
Group II	41	2.65	1039	176.42
Group III	47	3.44	1095	179.35
Group IV	77	7.29	1139	185.85

Average number, weight and value of mules over 7 years.

10	No. reported	Av. no. per. farm.	Av. wt. per. head.	Av. value per. head. (in $)
Group I	3	1.33	1150	127.50
Group II	13	1.15	1100	138.09
Group III	16	2.19	1148	142.57
Group IV	30	3.10	1174	151.23

The two preceeding tables again show, to a marked degree the tendency toward heavier and better work animals. In every case there is an increase except in the weight of the animals in group II and III of the second table and this fact is easily explained by the fact that there were only four mules reported in group I and this is not enough to give us a fair average.

Average number, weight and value of all horses.

11	No. report ing	Av. no. per. farm.	Av. wt. per. head.	Av. value per. head. (in $)
Group I	26	3.61	1138	146.91
Group II	102	5.57	1167	154.33
Group III	65	5.91	1202	158.83
Group IV	102	8.66	1215	158.31

Average number, weight and value of all mules.

12	No. report-ing	Av. no. per. farm	Av. wt. per. head.	Av value per. head. (in $)
Group I	12	2.25	1009	156.85
Group II	47	2.91	1051.	170.66
Group III	49	4.02	1103	182.34
Group IV	79	8.28	1138	187.76

Average number of all work stock per. farm and % mules.

13	No. report ing.	Av. no. per. farm.	Percent mules.
Group I	26	4.65	22.31
Group II	102	6.93	19.43
Group III	65	8.94	33.91
Group IV	103	14.91	42.58

It is noticeable that in all cases the work stock
increases in weight and value as the size of farm increases and
there is also a marked increase in the percent of mules kept
on the larger farms as shown by table 13. The reason for this,
without a doubt,is because of the fact that there is greater
occasion for hired help on the farm of largest area and it is
generally admitted that the mule will stand rougher treatment
and less care than will the horse.

The foregoing tables not only show a marked increase
in weight and value of all animals as the farm area increases but
also a perceptible difference in values of horses of all the
different groups and mules of the respective groups. In tables
11 and 12, group IV there is a difference of $29.45 in favor
of mules.

Percent of all work stock that are mares 2-7, percent
over 7 and percent geldings.

14	Percent mares 2-7 yr.	Percent mares Over 7	Percent geldings.	Percent mules.
Group I	32.23	24.79	20.66	22.31
Group II	27.77	25.89	27.64	19.43
Group III	22.89	21.17	22.03	33.91
Group IV	20.90	12.37	23.46	42.58

The table giving the percent of all work stock that

are mules is repeated here for sake of clearness. A point, as
shown in table 14, that is worthy of attention is the fact that
as the percent of mules increase with increase in area the per-
cent of mares, both under 7 and over 7, decreases, from 32.23 to
20.90 in case of mares 2-7 and from 24.79 to 12.37 in case of
mares over 7. The percent of geldings seems to remain fairly con-
stant or at least there is no perceptible change.

Average number and value of horses under 2 years.

15	No. report- ing.	Av. no. per. farm.	Av. value per. head. (in $)
Group I	10	1.8	104.16
Group II	54	2.39	94.95
Group III	37	2.46	103.91
Group IV	65	3.52	106.49

16

Average number and value of all mules under 2 years.

	No. report- ing.	Av. no. per. farm.	Av. value per. head. (in $)
Group I	9	2	100.00
Group II	33	5.54	104.19
Group III	28	4.32	114.52
Group IV	45	8.64	123.62

Tables 15 and 16 show a tendency toward an increase in value of all horses under 2 years and a marked increase in the case of mules under 2 years with the increase in area, as has been the case in all the work stock at all ages.

Number of mares kept exclusively for breeding and number kept for work that raise colts.

17	Exclusively for breeding.		For work and breeding.	
	No. reporting.	Av. no per. farm.	No. reporting.	Av. no per. farm.
Group I	3	1.33	14	2.14
Group II	24	2.37	69	2.80
Group III	15	2.46	45	3.04
Group IV	35	3.83	66	3.71

The above table shows that the number of mares kept exclusively for breeding and the number kept that raise colts is larger, comparatively, on the smaller farms than on the larger. In every group, in both cases ~~there is~~, there is, on the average, more than one mare per *100* acre of land, except in gruop IV and here there is about one mare to every two *hundred* acres.

Number of colts raised and percent. (Percent being based on number of mares bred)

18	No. report-ing.	Av. no. raised per.farm.	Percent raised.
Group I	12	1.87	66.17
Group II	78	2.24	70.00
Group III	45	2.45	63.50
Group IV	82	2.95	68.11

The average percent of colts from all groups is 66.46, or practically two thirds of all mares bred, raise colts. In the above table, again, there is to be seen a marked decrease in the number of colts raised as the farm area increases.

Average number of horse and mule colts raised.

19	No. reporting horse colts.	Av. no. per. farm.	No. reporting mule colts.	Av. no per. farm.	Percent mule colts.
Group I	7	1.43	9	1.44	56.52
Group II	50	1.71	48	1.55	46.56
Group III	36	1.49	28	1.64	46.23
Group IV	62	2.15	52	1.92	42.58

Table 19 shows that there is a marked decrease in all colts (per unit area) as the farm area increases and also that there is an increase in the percent of horse colts raised as the area increases.

There were 117 farmers that gave their preference as
to horse or mule colts and of these only 4 were in favor of the
horse colts, nevertheless, there are a greater percent of horse
colts raised than mule colts. The reason for their preferring
mule colts is the fact that they are more salable at immature
age and also bring a better price at any age as shown by tables
11 and 12 but where the farmer is breeding for his own use in
many cases he prefers the horse to the mule.

Out of 213 farmers, reporting their preference as to
fall or spring colts, only 6 were in favor of the fall colts.
There are various ideas, both for and against the raising of.
fall colts. It would seem that here in the Corn Belt where the
greatest rush for the work stock is during the spring and early
summer months that the fall colt, especially when horse colts
are raised, would be best and would allow, practically, a maximum
amount of work from the mares during the busy season and also
allow full time with the colt after it was born until it was
old enough to wean and at weaning time the following spring there
would be a plenty of good pasture for the colt, which is advan-
tageous. In case of mule colts, since it is the common custom
in this locality to raise spring colts, there is no question but
the spring colt can find a more ready sale at weaning time than
would the fall colt. Some good points are given by the farmers
who are following this line of work. One farmer says that"The
fall colt is always judged as a spring colt six months older"
Another says "Warmer weather to make growth while young". Another
says, "Spring colts are not as hard on their mothers"

Still another says, "Spring colts grow out better with less expense and care". Another says "Spring colts can be sold at any age but fall colts have to be kept till they are mature". Another believes, "Mares are in better condition to suckle" and still another says, "Spring colts don't diminish their mothers so in flesh" The above are some of the more logical reasons in favor of spring colts and following are some in favor of fall foals. One farmer says, "The fall colts come when work is light and weaned when pasture is ready in the spring".Another says "Fall colts can go right on grass at weaning time and do much better than on dry feeds". Another says,"I believe for our conditions fall colts would be better only it xx seems more natural to have the colts come in the spring" and another says "If I had a warm barn I would have my mares foal in the fall by all means" There are arguments both for and against but it would seem that in many cases the farmer raises spring colts because of the precident which has been established, which is not based on profits derived from the practice.

Average service fee paid for horse and jack.

20	No. reporting.	Av. amt. paid for horse.	No. reporting.	Av. amt. paid for jack.
Group I	15	13.23	16	10.37
Group II	69	12.88	60	10.05
Group III	39	13.07	37	10.30
Group IV	65	13.05	58	10.38

Average age and value of horse colts sold.

21	No. reporting.	av. age sold. (in mo.)	Av.value at selling.
Group I	2	8	62.50
Group II	13	9.92	80.67
Group III	9	8.22	75.55
Group IV	9	7	65.73

Above table shows the average age of selling horse colts ranges from 7 to 10 months at an average price of $62,50 to about $80.00 or in general,from 60 to 70 dollars at weaning time

Average age and value of mule colts at selling.

22.	No. reporting.	Av.age sold. (in mo.)	Av.value at selling.
Group I	9	6.33	81.66
Group II	36	6.7	87.80
Group III	18	7	91.47
Group IV	23	7.26	91.91

Table 22 shows that,in general, mule colts are sold from 1 to 2 months younger and bring nearly $20.00 per head more. This fact justifies the farmer to quite an extent in raising mules instead of horses and in such case it may be advantageous to raise spring colts instead of fall colts.

Difference in value of broken and unbroken stock.

23	No. reporting.	Dif. in horses.	No. reporting.	Dif. in mules.
Group I	8	23.75	8	19.12
Group II	34	23.00	32	21.30
Group III	24	25.41	24	18.85
Group IV	37	25.94	30	22.75

The figures in this table prove another point in favor of mules, namely; that they are less trouble to break or at least they are less expensive to break, the difference being about $2 to $6 in favor of the mule.

Average age and value of mature horses sold.

24	No. reporting.	Av. age at sale.	Av. value at sale.
Group I	8	6.62(yr)	151.25($)
Group II	48	6.33	151.98
Group III	26	6.34	148.15
Group IV	50	5.98	166.94

Average age and value of mature mules sold.

25	No. reporting.	Av. age at sale.	Av. value at sale
Group I	9	5.33(yr)	172.55
Group II	31	5.4	183.83
Group III	24	5.04	188.26
Group IV	50	5.26	200.08

The two preceeding tables (numbers 24 and 25) show a general tendency, of the farmers that make a practice of selling any mature work stock, to sell at an average age of about 6 to 6½ years for horses and 5 to 5½ years for mules. It is a noticeable fact that as the farm area increases there are as an average, better prices obtained for the animals and the average age at which they are sold is less in the groups containing the larger farms. The fact that the farmers on the smaller farms receive less for their animals, is not due to the age, given as their average, being too high and these animals beginning to depreciate; but rather because this average includes some animals of ages ranging too high to bring the maximum price therefore the average age of the group tends to run high and necessarily the values will be less.

Average age and value of horses purchased.

26	No. reporting.	Av. age (in yr.)	Av. value (in $)
Group I	6	3.01	149.16
Group II	22	2.45	137.27
Group III	23	2.54	114.48
Group IV	32	2.39	116.89

Average age and value of mules purchased.			
27	No. reporting.	Av. age (in yr.)	Av. value. (in $)
Group I	3	1	78.33
Group II	23	2.37	145.09
Group III	31	2.	128.19
Group IV	54	1.78	134.76

Tables 26 and 27 go to show that the farmers on the larger farms buy the animals,that they have to buy, younger and at less cost. In the case of horses there is a marked decrease in age and in value and likewise in the case of mules (except in group I where only three farmers reported and these reported buying only three mules in which case they were all yearlings) as the farm area increases.

It is also noticeable that the mules, as a whole, are younger than the horses and still they pay larger prices for them.

The general practice seems to be for the farmers to keep their work stock the year round, still there are a few who report selling their mules in the fall and buying young ones in the spring. One farmer says "I find that I can buy good young mules in the spring, do my summers work with them and sell them in the fall for about $20 to $30 per. head more than I gave for them and in this way I get my work done, a nice little profit and don't have to feed them thru the winter". This is a point well worth consideration tho it is easily seen that it could not be made a universal practice, and is only adapted to the few.

Average percent of the time the work stock are kept
busy in the winter time.

28	No. reporting.	Av. percent.
Group I	16	47
Group II	79	40
Group III	51	38
Group IV	79	44

Figures obtained by the Farm Management Department of the
University of Missouri show that the average number of hours
the horses put in on the average farms for the six winter months
is 2.2 hours per. day. If 10 hours per. day is to be considered
full time then the figures above, which are farmers estimates,
are about twice as high as *is* shown by accurate data. It has also
been shown that the average for the year is only 3.9 hours per.
day. This figure is much smaller than the farmer would estimate
and because of this fact it is deserving of attention. Each
farmer should answer for himself, how he is to keep his work
stock productively busy during the winter months. This was partial-
ly accomplished, by some of the farmers reporting, by part or all
of the following ways. (1) General farm work as hauling manure
feeding, bedding, hauling wood, etc, etc. (2) Marketing. (3) Hauling
building material. (4) Outside teaming. (5) Logging. (6) Fall
and winter plowing. (7) Gathering corn. (8) Filling ditches. (9)
Grading. (10) Clearing and breaking new ground. (11) Orchard
work. (12) Hauling gravel and cinders for improvements. (13) Discing

(14) Cutting up stalks. (15) Cutting brush and cleaning. (16)
Hauling manure from town. (17) Driving mail carrier. and (18)
Driving an auctioneer. The above may serve as suggestions and
help to solve the problem of employment for the work stock and
the hired help, as well, during the winter season.

Cost of keeping brood mares.

29	No. reporting.	Av. cost (per. head.)
Group I	14	53.01
Group II	60	39.57
Group III	34	40.82
Group IV	65	40.03

Cost of keeping other mares and geldings.

30	No. reporting.	Av. cost. (per. head)
Group I	15	56.89
Group II	51	39.11
Group III	27	40.01
Group IV	63	45.03

Average cost of keeping mules.

31	No. reporting.	Av. cost. (per. head)
Group I	8	53.83
Group II	38	36.13
Group III	27	38.92
Group IV	57	40.83

The above table shows that group I contains the farms
that are to a considerable greater expense or at least that
is their estimation of the case. The average cost of keeping
the various classes of work stock in group I is about $55. and
the cost in the other groups for the same classes is less than
$40.00 Groups II, III and IV are very comparable tho the cost
is slightly greater in group IV than in the other two groups.

Data obtained by the Farm Management Department of
the University of Missouri shows that the cost of keeping horses
to be $69.76 and mules $66.39, not including interest on investment
taxes or incidental expenses such as shoeing, veterinary treatment,
clipping, etc, etc. By adding to the above figures, the interest
at 6% on the investment of the average horse and mule, as shown
in tables 12 and 13, the cost of keep then is $78.67 for horses
and $77.05 for mules besides the taxes and incidental expenses
which would easily bring the total cost well above $80.00 in
both cases.

According to the above we see that the average farmer

ordinarily estimates the cost of keeping his work stock at approximately one half of the actual cost. When the farmers thruout the state and the country come to realize this fact there will be a tendency among them to bring about a closer balance between their work and the amount of work stock kept to perform that work and greater attention will be paid to the efficiency of the work animals.

Grading of young work stock for efficiency.

32	No. reporting.	No. of points.
Group I	6	70
Group II	43	76.14
Group III	27	76.85
Group IV	49	79.59

Grading of mares and geldings for efficiency.

33	No. reporting.	No. of points.
Group I	9	84.44
Group II	43	91.09
Group III	30	87.01
Group IV	55	87.34

Grading of mules for efficiency.

34	No. reporting.	No. of points.
Group I	4	92.5
Group II	31	100.42
Group III	28	97.25
Group IV	44	98.45

The above tables, numbers 32, 33 and 34, show that mares and geldings are generally considered much more efficient than the young and immature work stock and also that mules are exceedingly more efficient than either of the other two classes. The average number of points allowed mules is about 98 whereas with mature horses it is about 87 and young stock about 76 or a difference in all cases of about 11 points.

Average number of acres operated per. head of work stock.

35	Av. no. of head kept.	Av. no. acres operated per. head.
Group I	4.65	19.19
Group II	6.93	26.02
Group III	8.94	30.96
Group IV	14.91	49.26

Table 35 shows that number of acres operated per. head
of work stock is more than twice as great in the group of larger
farms as it is in the group of smaller farms and nearly twice
as great as in the second group. These figures are very comparable
with those obtained by Prof. G. F. Warren of Cornell[*] In his
bulletin he shows that the average number of acres per. horse
is 49 on all farms of 200 acres and over, which would include
both group III and IV in this work.

Average size of farm, number of work stock, number of acres
operated per horse and per cent of the time they are kept busy.

36	No. report- ing.	Av. size of farm.	Av. no. of work stock.	Av. no. acres operated. per horse.	Per cent of time kept busy in winter
All farms	296	353.48	9.21	35.37	41.89
Dairy farms	34	282.7	8.84	31.93	46.9
Beef cattle farms	75	481.47	12.12	39.72	38.56

For the above table, number 36, there were 34 of the farms
that were strictly dairy farms and 75 that were strictly beef
cattle farms selected and data taken from them to compare with
the average of all farms included in the investigation. It is
very evident that the dairy farmers keep more work stock, compara-
tively than those on strictly beef cattle farms of all farms in
general but they keep them busy a greater per cent of the time
in winter and this means a greater per cent of the time thruout

[*]Cornell Bulletin No. 295

the year. There is a question, however, if the dairy farmer
does not more than ofset this one point by the fact that he
keeps more work stock, for an equal area, than the other classes
of farmers.

During this era of agricultural progress there are many
features of the work that demand our special attention and
the problem of work stock management is not a minor one of the
many. It is not an uncommon thing to see an article in the
current magazine or in the daily news paper but these, many
times, are based more upon fiction than upon facts and do not
serve to solve the problems before us. Munsey's magazine for
March 1913 contains an article by Herbert N. Casson on "The Horse
Cost of Living" in which he says "Exit the horse-enter the truck
and tractor". In this article he tells of the enormus cost of
keeping the horses of the country one year, and their relative
inefficiency, and elaborates on the advisability of the tractor
and truck, but there is considerable of a question if the day
has yet come when we shall dispose of our work stock and replace
them with the motor truck and tractor. It is an evident fact that
in the Corn Belt area where corn is the most important crop
produced and as yet the only methods of cultivation, that we have
available, is the work stock and horse cultivator, we are in a poor
position to do away with the work stock. It is also quite a
question if the tractor can be used supplimentary to the horses
in this country or state where corn is grown to such an extent and
where cultivation is the limiting factor of the number of acres

that the farmer is able to raise.

The Bureau of Statistics of the U.S. Department of Agriculture found, in a recent investigation, that the average cost of raising horse colts, up to the age of three years ,was $104.06. The value of the labor done by the animals up to this time was $7.52 This leaves a net cost of $96.54 per horse colt which is 70.9 per cent of the value of the animal at three years of age. The total cost includes, feed, shelter, service fee, value of time lost by mare in foaling, veterinary services, care, breaking to halter and $5.01 for other expenses.

After a careful study of the problems bearing directly on work stock management there seems to be no question as to the advisability of the farmers keeping mares for all or at least a part of their work stock. These mares should be made to produce colts as regularly as possible and thereby return a profit to their owner other than by the work they perform. These colts should,without a doubt, be mule colts if the owner cares to dispose of them at an early age and if mule colts /it is better to have the mares foal in spring but if the colts are to be kept by the owner until maturity and other conditions favorable it is well to raise fall horse colts.

If mares are to be kept and bred to raise colts they should, without a doubt, be kept as long as they will breed and at the same time prove efficient workers. The other stock should be disposed of at the time when they will "top the market" or at least should be sold before they reach the age when they

rapidly decrease in value. This applies to either geldings or mules. These animals can be purchased as two, three, or four year olds, kept three to five years and worked and then sold at as good, or possibly better, price than was paid for them. Older work stock is not as efficient and the depreciation in value is a point well worth consideration.

SUMMARY

After a careful study of the foregoing investigation the following points prove themselves worthy of our attention and may be summed up as follows:

(1) As the size of farm increases there is a noticeable increase in size and value of the work stock. The value of horses and mules ranges from #10.00 to $30.00 per head higher on the large than than on the small farms.

(2) The per cent of all work stock that are mules increases as the size of the farm increases. The per cent of geldings remains about the same and the per cent of mares decreases with increase of farm area.

(3) The value of mules at any age is higher than that of horses at the same age.

(4) There is a decrease in the number of young work stock (under 2 years old), per unit area,as the farm area increases

(5) There is a marked decrease in the number of mares kept exclusively for breeding and those kept for work that raise colts (per unit area) as the farm area increases.

(6) The number of colts raised per farm does not increase at all in proportion to the increase in area. On the smaller farms there is an average of one colt raised per every 72 acres and on the larger farms there is only one for every 310 acres.

(7) The per cent of colts raised is about 67 in all cases there being no difference in regard to size of farm.

(8) There are about equal numbers of horse and mule colts raised.

(9) Practically all farmers prefer spring colts to fall colts but this preference does not seem well founded in many cases.

(10) The service fee for studs ranges from $2.75 to $3.00 more than the fee for jacks.

(11) The average age of selling horse colts is 8 months and of mules about 6.5 months. The average price respectively is about $70.00 and $86.00

(12) The average cost of breaking differs $2.00 to $6.00 in favor of mules over horses.

- (13) The average age of selling mature work stock is about a year younger for mules than for horses and they bring from $20.00 to $35.00 per head more than the horses.

(14) The average age that the animals are purchased, if any, is about 2½ to 3 years old for the horses and 1¾ to 2½ for mules with the average cost ranging about the same.

(15) The actual cost of keeping work stock per year is about $80.00 which is approximately twice as high as the farmer estimates it.

(16) It is generally considered that the mule is much more efficient than the horse.

(17) The average number of acres operated by one horse is 19.19 in group I, as compared to 49.26 acres in group IV or in other words one horse can operate 2½ times as much on the large farm as on the small one.

(18) As the size of farm increases and the amount that one horse operates increases the crop yields DO NOT decrease but show a tendency to increase with increase in area.

(19) The dairy farms are smaller and keep, comparatively, more work stock than other types of farms but they keep their work stock busy a greater per centage of the time.

(20) The beef cattle farms are larger and keep less work stock, on the average, than the farms in general but they do not keep their work stock busy as great a per centage of the time as does the average farmer.

(21) There is a wide margin of profit between the cost of raising and the selling price of three year old horses and without a doubt that margin is greater for mules than for horses.