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University of Missouri

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'Kitchen police'

Researchers measure energy expended in preparation of food

By Margaret Kraeuchi
University Information Services

You are in a cafeteria line, considering the chicken entrees. The price quoted has a certain amount itemized as the cost of the energy used to process and serve it. "Barbecued chicken—$2.49; energy $.20. Fried chicken—$2.99; energy, $.60."

A little mental math tells you that it took three times as much energy to give you the fried chicken selection as it did the barbecued chicken. Are you willing to pay the higher fried chicken price, if you know most of the difference can be attributed to energy? How much will you allow your taste buds to dictate to your pocketbook?

Such energy accounting—and consumer decision-making based on it—will eventually be widespread in our society. The food processing and food service industry is a good place to develop the methods: it's an energy-intensive industry anyway, but by 1980 Americans will be eating *half* their meals away from their homes.

University of Missouri researchers are the first to show how energy accounting can be instituted throughout a specific industry. Ken and Nan Unklesbay (yes, they're a husband/wife team) wanted to prove that the food industry could use energy more efficiently—and to show how food laws and regulations abet energy inefficiency.

But the two kept nutrition at the heart of their study: in fact, the standard of measurement for their energy accounting model is stated in energy expended *per nutritional value.* Nutrition and food preparation techniques are Nan's business as an assistant professor of food science and nutrition at UMC. Ken, UMC assistant professor of bioengineering and advanced automation, knows machines and energy relationships.

Ken and Nan Unklesbay of UMC have developed an energy-accounting model for measuring the amount of energy used in preparing and serving chicken—fried, barbecued, etc.—and their findings are interesting. Now they plan to go to work on an expanded menu, while studying indirect costs as well.

The Unklesbays chose to test their model with a single menu item: chicken. They measured the amount of energy it took to prepare and serve a gram of chicken protein as fried, baked, barbecued, tetrazzini, cacciatore and other chicken recipes. Why chicken? It's a popular source of protein for Americans, it can be processed in several ways (by chilling, freezing and canning) and it is served in different types of food-service operations—commissary, ready-prepared, assembly/serve, for instance.

And *any* food item can be analyzed for energy consumption, using their energy accounting model, the Unklesbays say. Into their model go data on quantities and types of energy needed to operate each step of a process, quantities and types of the foodstuff entering and leaving each step, the energy gained or lost by all materials involved in the process and energy lost from each step.

At the end of all the computations is the accumulated energy used to process that gram of chicken protein.

But the Unklesbays emphasize that their study involved only the direct energy costs in food processing and food service—meaning that agricultural, retailing and packaging costs were not considered.

Testing the model meant they had to spend a lot of time in chicken-processing plants and industry kitchens. They found industry people intensely interested in the project and eager to help.

Still, grasping all the implications of their energy accounting study is a little like trying to throw a fence around an amoeba—just when you think you've got it confined, a new vista opens up again. "We found, says Nan, "that a gram of chicken protein prepared without regard to energy expended could require many times the energy used to prepare chicken more efficiently. Serving leftover chicken, for example, multiplied the energy use six times." The chef will just have to risk running out of a menu item rather than have leftovers, they say.

As with anything else, says Ken, people pay attention to what's expensive and no attention to what's cheap. "For too long energy has been regarded as the latter. That's evident in the way food processors and food service operations regard their utilities costs: it's overhead. . . a lump-sum cost of doing business.

"Almost no U.S. industries have distributed meters in plants which monitor the amount of energy being used during production, and none have the highly detailed step-by-step energy accounting which our model provides. Another example of 'energy is cheap' thinking is the way some large food service kitchens turn on their ovens in the morning and let them run until the kitchen is shut down at the end of the operating day—even if all their baking is done in the morning and nothing is scheduled for the ovens thereafter."

He points out that such wasteful energy use is merely passed on to the consumer, who pays in higher food tabs. "Before you can manage *anything*, you must first account for it," Ken says.

"It was fun to see one chicken producer from West Virginia look at his operation with new insight," Nan remarks. "He suddenly realized that one of his good customers for West Virginia chickens was Hawaii—even though there are chicken

(continued on page 4)

New professorship bolsters Judaic studies program

A $100,000 grant from the Oppenstein Brothers Foundation of Kansas City has made possible the establishment of a new professorship at UMKC, the Oppenstein Brothers Distinguished Professorship in Judaic Studies.

The professorship will greatly strengthen UMKC's interdisciplinary Judaic studies program, according to George Dahlgren, dean of the UMKC College of Arts and Sciences.

"We are most appreciative of the grant and are especially pleased that it offers the foundation as well as other supporting groups a timely opportunity to be of significant assistance to UMKC in not only stabilizing, but also enhancing a new and highly successful interdepartmental program of Judaic studies.

"The program is unique to this part of the country and has proven to be of interest to both Jewish and non-Jewish students. It also has been evaluated as excellent and has provided a broadening of University offerings in the field of widely accepted scholarship."

The Oppenstein Brothers Foundation was created through a bequest of Michael Oppenstein, Kansas City jewelry retailer and real-estate investor, in order that the accumulated wealth of his late brothers—Harry, Samuel and Louis—and his own might be used for religious, charitable, scientific and educational purposes.

"We are pleased that the foundation . . . is able to assist in financing the Judaic studies program," said John A. Morgan, head of the OBF disbursement committee. "We believe that the brothers, whose constant concern for people is reflected by their philanthropy, would have been pleased with this particular project."

Sidelines

Award to Weinberg

Saul S. Weinberg, professor of classical archaeology and director of the Museum of Art and Archaeology at UMC, will receive his campus's Distinguished Faculty Award tomorrow at UMC's 135th annual commencement exercises.

An internationally known archaeologist who has been involved in important excavations in the Middle East and in Greece, Dr. Weinberg is known on campus as the "father" of the Museum of Art and Archaeology, which has grown under his direction from an academic exhibit to a full-fledged museum.

Dr. Weinberg joined the UMC faculty in 1948. He has served as head of the department of classical languages and archaeology and of the department of art history and archaeology.

UMKC honors two

Two UMKC faculty members will be honored tomorrow at commencement exercises in Independence for excellence in undergraduate teaching. They are Charles E. Carter, instructor in accounting, who will receive the AMOCO Award, and Carla L. Klausner, associate professor of history, who will receive the Shelby Storck Outstanding Undergraduate Teaching Award.

Dr. Klausner has been on the UMKC faculty since 1964, following her completion of doctoral work at Harvard. Mr. Carter joined the faculty in 1974. He is a doctoral candidate at UMC.

Lectureship

A professor of medicine from the University of Pennsylvania will be the first lecturer in the newly founded Dorothy Lee Ross Distinguished Lectureship series at UMKC.

Dr. Alfred P. Fishman, director of the cardiovascular-pulmonary division in Penn's School of Medicine, will speak at 3 p.m. today in Theater A in the med school building, 2411 Holmes. His subject is to be pulmonary edema.

The new lectureship was set up by W. W. Ross III in honor of his mother for the graduating class of the UMKC School of Medicine.

UMC awards

Four UMC faculty members have received the 1977 AMOCO Good Teaching Awards for distinguished undergraduate teaching. The recipients: William B. Bondeson, professor of philosophy; Loren D. Kintner, professor of veterinary pathology; M. Gilbert Porter, associate professor of English; and Jerry G. West, professor of agricultural economics.

UMSL awards

The following UMSL faculty members have received AMOCO awards for excellence in teaching:

Ruth S. Jones, associate professor of political science; Joyce Y. Corey, associate professor of chemistry; Ingeborg M. Goessl, assistant professor of German and head of the modern languages department; George E. Mowrer, professor of behavioral studies; and Earl W. Wims, assistant professor of marketing.

Honorary degree

Robert L. McNamara, professor emeritus of rural sociology at UMC, will receive an honorary doctor of science degree at commencement exercises this month at South Dakota State University.

Dr. McNamara, who holds bachelor's and master's degrees from South Dakota State and a Ph.D. from Ohio State, joined the UMC faculty in 1944. He has served as president of the Rural Sociological Society, the Midwest Sociological Society and the Midwest Council for Social Research in Aging.

New dean

The next dean of UMC's College of Home Economics will be Beatrice Burns Litherland, associate dean of the College of Home Economics at North Dakota State. Ms. Litherland is to assume her new responsibilities on July 15. She will succeed Margaret W. Mangel, who plans to retire.

Feedback

The following letter, which was received recently by President Olson, was forwarded to Spectrum *for publication, along with Dr. Olson's response.*

I have been working within the University as a secretary for one and one-half years. Being a part of the Stenographical Services I am sent to different parts of the University depending on where I am needed. Therefore, I see how efficiently the University offices are functioning. As well as a secretary, I am a conservationist which brings me to the point of the letter. I thought you might be disturbed if you saw the waste of money and materials within the University system. I have seen people throw away up to 700 sheets of paper at a time because of one mistake not caught before printing. Also much paper is thrown away because of over printing and material being out of date. And not long ago I was using a ditto machine that was so badly in need of repair (it wasn't working properly for the whole month I was there) that I wasted 75 sheets of paper in order to print 200 sheets.

I have thought of a few simple steps in changing the system that could save the University a lot of money and also save a lot of energy in the form of wood. We could use postcards in the place of short letters. Postcards are not presently provided by the General Storeroom. Postcards have at least one-fifth the cellulose material of a sheet of paper and an envelope. I have seen a governmental agency use postcards. Also, 9½-by-4¼ campus envelopes which are used very frequently could be built a little sturdier and used many times before disposal which would save a lot of expense. I have seen a few of these within the University but only in a couple departments. Also, I have seen the University use recycled paper in the form of pads in one department. This saves a lot of expense for them. This is done within the PAVTE department produced by the Instructional Materials Laboratory in the basement of Industrial Education. However, they only use small pads whereas the savings would increase a lot if people recycled letter size sheets so that the yellow lined pads (8½-by-11 tablets costing $.2104 each at the General Storeroom) would be replaced. This is one article that goes as fast as I order it. I have been making my pads from recycled paper all along and was suddenly pleasantly surprised when I saw this department doing it on such a large scale for the whole department.

With so much paper used in such a large operation don't you think the paper that could not be immediately used in pads, could at least be taken to the Community Rehabilitation Center, 606 Pannell St.? I have collected a lot of paper on my own from the University and take it to be recycled but I need others to help in order to have more impact. People are now realizing that they need to conserve after such a long, hard winter when they felt threatened that their energy sources may run out. Still people do not seem to act with this new knowledge in mind when considering the rapid depletion of forests. For example, the *New York Post Dispatch* cuts down 300 acres of wood for one Sunday edition. Also, now that gas is so expensive and uncertain people are turning to wood for heat. Here in Columbia, it is incredible how many people are supporting themselves during the winter selling firewood. Every winter there are signs everywhere and many ads concerning this. In fact, my fiance did this for part of the winter this year. Yes, the woods are also a draining energy source.

I did not know who to write to about this. I wanted to choose someone who would very thoughtfully study this proposal and see it's important when considering conservation of money and energy. I hope to hear from you soon about what you think we can do to start conserving on a large scale. If we work this out here, we can possibly influence other universities to follow our step. Then we will really see the impact of large scale conservation.

JOAN READ
Stenographic Services
UMC

This is in response to your letter of Mar. 31, 1977, about the conservation of waste paper and printed materials. Your letter contains some good suggestions. I feel certain that the persons addressed in your letter will look into those items that are appropriate to their specific operations.

The University's Central Administration, principally those units involved with the computer operation, has taken some steps along the lines you mentioned. It has had a program to sell waste paper since 1971. In that six year period, a total of 614,452 pounds of waste IBM cards, and an additional total of 527,188 pounds of waste paper has been sold for a total of $61,010.24. Each six months, the accumulated total of waste paper has been handled through the normal bidding process and has been sold to the highest bidder.

Those units which have participated are Data Processing; Computer Services Center; Electrical Engineering and Development; Medical Computer Center; and the Rolla campus.

In the Records Management Program at the University those files that are obsolete and are ready for destruction are shredded and used for packing. Any surplus that is not needed for packing is sent to the recycling center.

These are two examples to illustrate what can and is being done. I hope we can intensify our efforts to accomplish a good deal more.

Thank you for your letter and I hope you will continue to make suggestions whenever you see the possibility for conservation and cost savings.

JAMES C. OLSON
President
UM

Olson letter to Cabinet on DNA research

To: Members of the University Cabinet
From: James C. Olson, president
Subject: Projects involving recombinant DNA molecules

As all of you are aware, DHEW, through the National Institutes of Health, has implemented guidelines for research involving recombinant DNA molecules.

In keeping with these guidelines, I have appointed an Institutional Biohazards Committee, and a roster of that committee is attached for your information.

Please advise your faculty and staff of the need to notify the Institutional Biohazards Committee of ongoing or contemplated research related to recombinant DNA molecules. Under the guidelines, researchers already performing this type of research are required to cease, until their projects have been certified by the committee. It is proposed to use outside consultants in the certification process until adequate procedures can be established.

Copies of the guidelines, and NSF's subsequent "Important Notice No. 64" are available in the research administration offices on each campus. Researchers are also to be encouraged to contact their campus representative on the committee.

Committee roster

Paul F. Agris (chair.), assistant professor, biological science, UMC;
Alan F. Berndt, professor, chemistry, and assistant dean, graduate school, UMSL;
J. B. Clark, professor, metallurgy, and associate graduate dean, UMR;
Philip D. Harriman, assistant professor, biology, UMKC;
David J. Harris, chief, Genetic Counseling Center, UMKC;
William R. Lower, group leader, Environmental Trace Substances Research Center, and assistant professor, family and community medicine, system;
A. H. Emmons (ex-officio), vice president for research, system;
Paul R. Keenan (ex-officio), assistant to the vice president for research, system.

Poore heads credit union

The Mizzou Employees Federal Credit Union has furnished the following updated list of board members, committee members, representatives and staff:

Board of directors—William D. Poore, pres., system; Kee W. Groshong, vice pres., UMC; Ronald Rozell, treas., UMR; Mary J. Adkins, secy., UMKC; Howard D. Pyron, UMR; Pauline R. Miles, UMC; Bonnie L. Sims, UMKC; Anthony Lampe, UMC; Walter L. Johnson, UMC; John D. Phillippe, UMSL; Anne D. Robinson, UMC.

Supervisory Committee—Richard J. Otto, chair., system; Anthony W. Lampe, UMC; Samuel E. Scobee, system; Robert L. Laney, system.

Credit Committee—Barbara C. Hagen, chair., UMC; Arlene M. Robinson, UMC; Gary Chandler, UMC; Paul Tipton, UMC; James Reid, UMC; Wyndel Hill, system; Larry Taylor, UMC.

Publicity Committee—Anne D. Robinson, UMC.

Credit union representatives—Lee R. Dodd, UMSL; Howard Kincaid, UMC; Howard Pyron, UMR; Lorraine Walls, UMR; Sue Garman, UMKC; Ronald Cromwell, Delta Center.

Credit union staff: Karl V. Guettler, mgr.; Karen C. Hiatt; Sue Aubuchon; Jana Manetzke (all Columbia).

Vacation policy

This letter is to request support from all University of Missouri Schedule II (clerical, maintenance, service, etc) employes in our request for modification in the University of Missouri vacation policy. The change which we are requesting is that for length of service over 20 years the annual vacation accumulation be extended from four to five weeks. All of the UMR Schedule II employes except one with 20 years service or more have requested this change through our campus representatives to the Retirement and Staff Benefits Committee. We are hopeful that through this letter, Schedule II employes on the campuses at Columbia, St. Louis and Kansas City will join us by contacting their representative to the Retirement and Staff Benefits Committee in support of this modification.

For the past several years adequate cost of living increases have not been given to Schedule II employes with several years service. The reasoning used for allowing minimal or no salary increases for these individuals is that they are at the maximum salary range for their positions. Extending the length of vacation time is one small way to give recognition for the length of service of an employe without increasing the salary cost of running the University. . . .

JESS LEE CARNEY
Academic Adviser
UMR

Scientist probes effects of aging on membranes in nervous system

By Jyoti Dutta
University Information Services

Dr. Albert Y. Sun, research professor at the University's Sinclair Research Farm, and his associates are engaged in a research project that might very well offer some solutions to the problems of old age.

Elderly persons often are afflicted with impaired mental function which may progressively lead to senile dementia — a very marked loss of the powers of memory, attention and control, Dr. Sun explained. This has been a serious problem because its impact not only affects the well-being of individual persons, but also has great social and behavioral consequences.

Dr. Sun has a three-year research grant of $92,585 from the National Institutes of Health (NIH) to investigate the effect of the aging process on the structure and function of membranes in the central nervous system at the cellular and subcellular level. He believes examinations of the effect of aging on the structure and function of CNS membrane, as well as membrane-dependent active transport processes related to neurotransmission, may help to understand the deteriorating nature of functionally important organs upon aging and its relation to the behavioral aspect and mental states of the aged.

While the effects of aging may be readily perceived, their causes are not yet clearly understood. Dr. Albert Sun of UM's Sinclair Research Farm is trying to discover why elderly persons are so often afflicted with impairment of mental abilities.

"Normal mental activities are dependent on brain functions," Dr. Sun said. "From this knowledge we assumed that a lot of aging factors might affect the brain functioning. One of the hypotheses is that the deterioration of membrane caused by peroxidation of membrane components leads possibly to senile dementia. We want to test this hypothesis, and see if any kind of measure can prevent this oxidative process. Addition of antioxidants such as vitamin E to the diet is one of the measures currently under observation.

"We have been able to establish that oxidation in the brain increases with aging," Dr. Sun said. "Our results indicated that the endogenous norepinephrine content is lower in the hypothalamus and brain stem of older rats than in the younger animals. We have also observed in these animals that the age pigments were apparently absent in the brain tissue from young rats but become a very distinct feature with increased age." He emphasized, however, that much more work still must be done before we can draw any conclusions.

Related research on aging has been confined primarily to studies searching for alterations in proteins, nucleic acids and lipid composition in brain tissues, Dr. Sun explained. Although there may be studies concerning some neural enzymes, and perhaps some aspects of lipid metabolism, investigations on the function of neural membrane and the dynamic aspects of neurotransmitter substances in relation to the aging process have not been extensively examined.

"Only through a better understanding of the neurochemical basis of aging can preventive measures for problems such as senile dementia be developed," Dr. Sun said.

"This is exactly what we plan to do," he said. "Drugs which are used for treating the elderly patients, such as barbiturates, amphetamine and other sympathomimetic agents are known to influence the dynamic equilibrium of neurotransmitter substances, especially biogenic amines in the brain. Sensitivity to drugs, however, may vary widely in different age groups. By understanding the metabolic differences among the various age groups, more effective therapeutic measures may be developed for treating the elderly patients afflicted by senile dementia or other disease states.

"Working at the neurochemical level is a very complicated process," Dr. Sun said. "Neurochemistry is a new thing. Previous studies were not concerned with brain functions at the neurochemical and molecular level. We are one of the very few groups in the nation researching in this area.

Dr. Sun's studies have been very well accepted. "People are interested in our work and the results we present at scientific meetings," he said.

"The research is a multidisciplinary effort in order to give a better understanding of the cause and nature of the aging process in the brain," Dr. Sun concluded. "It is our hope that new methods may be devised to protect the human being against the harmful effects of peroxidation so that a more healthy and effective life can be achieved for our elderly population."

Senate committee approves total of $136,013,664 for UM

The Senate Appropriations Committee has approved $136,013,664 in state appropriations for University of Missouri general operations for the 1977-78 fiscal year. This is the same amount recommended by the House of Representatives and Governor Teasdale.

In a departure from the usual practice of making a lump sum appropriation to the University, the Senate Committee approved budgeting the funds to four categories: the four campuses and the University hospital; statewide extension; research; and central administration. (See table.)

The recommendation for funding represents a 6.5 per cent increase over the $127,709,087 received by the University for the current year. Likewise, each of the four categories represents a 6.5 per cent hike.

The bill now goes to the Senate floor for consideration.

	1976-77 (Current year)	Approved by Senate Appropriations Committee 1977-78	Increase
For the four campuses and University Hospital	$115,489,558	$122,999,532	$7,509,974
Statewide Extension	5,804,356	6,181,798	377,442
Research	1,522,390	1,621,387	98,997
Central Administration	4,892,783	5,210,947	318,164
Total	$127,709,087	$136,013,664	$8,304,577

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Commission post

Bill Yelon, group leader at the reactor facility and expert in neutron diffraction and inelastic scattering, has been appointed to the nine-member neutron diffraction commission of the International Union of Crystallography. He will also edit the commission's newsletter.

Bob Brugger, director of the reactor facility, who recently promoted Yelon from senior research scientist, called him "an excellent researcher" and expressed pleasure that the union's newsletter would emanate from UM: "It gives us the inside track on informal scientific information before the field gets it—and tells the rest of the world that the University of Missouri has strong capabilities in neutron studies."

Dr. Yelon received his Ph.D. from Carnegie-Mellon and spent two years at Brookhaven Laboratories and three years at the Institut Laue-Langevin, Grenoble, France. He is one of four Americans on the commission, the other five being European. Dr. Yelon said a recent issue of the newsletter contained an article on the upgrade of the UM reactor from five to 10 megawatts; the upcoming issue will treat the current state of neutron studies at this reactor.

$1,000 to dean

The acting dean of UMC's College of Arts and Science, David McDonald, has been chosen to receive the $1,000 Byler Administrative Award for 1977.

Teaching award

The American Psychological Foundation has selected Fred McKinney, UMC professor of psychology, to receive its 1977 Award for Distinguished Teaching in Psychology.

The award and a $1,000 stipend will be presented to Dr. McKinney in August at the association's annual convention.

Honor for Dimond

E. Grey Dimond, provost for the health sciences and professor of medicine at UMKC, has been designated a Corresponding Member of the British Cardiac Society in recognition of his achievements in American cardiology.

Lago honored

Gladwyn V. Lago, UMC professor of electrical engineering, has received the $1,000 Halliburton Award for Teaching Excellence.

Library

Krauskopf honored

The Alumnae Anniversary Fund Committee for the Recognition of Faculty Women has presented its annual award of $1,000 for the outstanding faculty woman to Joan Krauskopf, professor of law.

UMKC medal

The Chancellor's Medal, the highest non-academic award presented by UMKC, has been given this year to Donald J. Hall, president of Hallmark Cards, Inc.

The medal was presented to Mr. Hall by Wesley J. Dale, acting chancellor, at the 18th annual University Associates dinner. It was the first time that the medal was given to a second member of a family. Mr. Hall's father, Joyce C. Hall, founder and chairman of the board of Hallmark, received the award in 1961.

Aid group award

UMR's director of student financial aid, Raymond L. Pendergrass, is the recipient of the "Missouri Award" of the Missouri Association of Student Financial Aid Personnel. The award recognizes his "dedicated service to students and to the financial aid profession."

Extension post

Doil F. Felts, director of UMC's Center for Independent Study through Correspondence, will serve as a member of the Board of Directors of the National University Extension Association for 1977-78 and 1978-79.

Peden honored

UMC's 1977 Byler Distinguished Professor Award will be presented to Margaret Peden, professor and head of the department of Romance languages, at commencement exercises tomorrow in Columbia.

Hospital Hill Run

Joggers and runners from all campuses are invited to compete in the fourth annual Hospital Hill Run in Kansas City on June 4. The race is scheduled to begin at 8 a.m., with the "starting" and "finish" lines at Crown Center.

Included will be 42 age-group competitions in the mile run, quarter marathon plus (7.7 miles) and half marathon (13 miles).

Persons wishing to register for the race may do so through the Mid-America Masters Track & Field Association c/o Academy of Health Professions, 2220 Holmes, Kansas City, Mo. 64108.

Southwinds

Copies of the latest issue of *Southwinds*, the literary anthology published by the Greater Rolla-UMR Metropolitan Literary Society, may be obtained in the UMR University Center-East or through the UMR humanities department for $1 apiece.

Report to Olson urges support for UM's 'deteriorating' libraries

The system Committee on Library Resources has submitted to President James Olson a report on the status of libraries and its recommendations for library development. The 20-page report is based on studies and user surveys made over the past three years.

Completed in time to influence the 1977-78 budget recommendations for UM libraries, the report calls attention to their "deteriorating" condition because of inadequate support.

Major recommendations:

• A special-purpose cooperative library building constructed in Columbia at the earliest possible date to relieve critical space problems at UMC's Ellis Library and help the UMC library meet the other campuses' library materials needs. The facility is not intended to solve other campuses' critical space needs except to satisfy long-range needs for off-site storage of suitable materials. The building is to provide direct access to users and to allow delivery from its holdings within 24 hours of request.

• All campuses' libraries should subscribe to the Ohio College Library Center (OCLC) for automated cataloguing, interlibrary loan and serials support services. OCLC provides a central record of newest acquisitions accessed from all campuses to help in resource sharing. Archival tapes must be purchased from OCLC for a local machine-readable bibliographic data base, should suitable library management and user service automation systems become available in the future. Additional funding should be aggressively sought for retrospective conversion of UM bibliographic records to machine-readable form within five years. Present automated literature search services should be available through each campus library.

• Additional resources must be available to improve campuses' resource sharing for fast transfer of needed material.

• The directors of libraries are to review their libraries' policies annually to ensure that UM library resources are reasonably available to individual faculty and students on all campuses.

• The Office of the Vice President for Academic Affairs should fund a regular library studies staff, responsible to the directors of libraries, comprised of at least one full-time operations research person with some library background, and secretarial and research assistance. The staff would develop standard data gathering and reporting programs and help evaluate present and proposed library activities and programs.

• The salary and wage base for each of the campus libraries should be improved where necessary to achieve a "B" rating for staff size established by the Association of College and Research Libraries. (A library must have 75 to 99 per cent of the minimum number of professional staff members, determined according to campus academic program offerings, faculty size, student enrollments, etc., in order to achieve a "B" rating.) The rating should be attained within five years and maintained thereafter.

• Funds for library acquisitions should be augmented as necessary to bring the size of each campus library collection to the "B" level ACRL standard within five to 10 years. (For collections, a "B" rating means having 80-90 per cent of the minimum number of bound volumes, again determined according to academic offerings and faculty/student numbers, etc.) When minimum levels are reached, collections should grow at a five per cent annual rate, the rate at which new publications are increasing.

A limited number of copies of the report are available from Mel George, academic vice president.

Members of the committee:

Columbia—John Gribbin, libraries director; Gene S. Cox, professor, forestry-fisheries-wildlife; Owen Koeppe, academic provost; John Murdock, professor, economics.

Kansas City—Kenneth LaBudde, libraries director; Ross Shepherd, professor, economics; Herwig Zauchenberger, dean, graduate studies; Thomas E. Miller, professor, administration.

Rolla—Ronald G. Bohley, library director; Lawrence Christensen, assistant professor, history; Jim C. Pogue, provost, interim chancellor; Peter G. Hansen, professor, engineering mechanics.

St. Louis—Robert C. Miller, libraries director; Marcus Allen, associate professor, modern languages; Blanche Touhill, associate vice chancellor, academic affairs; Jane Miller, assistant professor, chemistry.

UMca—Melvin D. George, academic vice president; Ardath Emmons, research vice president.

Food study finds energy being wasted in many ways

(continued from page 1)

producers on the West Coast. That successful businessman pinpointed a basic energy inefficiency in his own situation."

Energy cost accounting, they stress, should be built into the cost of foods—rather than averaged—so that the costs can be accurately passed on to the consumer. Only then will consumers start making pocketbook decisions toward more efficient energy use in the food industry. But, says Ken, "industry won't install energy-monitoring equipment until they get something out of it. When energy accounting can be shown to be practical, the government may dangle the carrot of tax credits for energy conservation to induce installation of monitoring equipment."

Americans insist on high quality food at all times of the year. "In January the U.S. tomato crop froze—so we imported them from Mexico. We'd rather have fresh vegetables any time; second choice is frozen, with canned as the *last* choice. Obviously, food must be stored, but it should be done at the least energy-expensive level," Ken notes.

Food waste and energy waste have many manifestations in the Unklesbay study. Plate waste, they say, is a massive problem and represents both food waste and the waste of energy to prepare it. There's energy inefficiency in leftover food which must be stored, cooled or frozen and then reheated in a new recipe. There's enormous waste in foods recalled and destroyed because of improper preparation or storage practices. Because our food quality standards are so high, parts are getting thrown away—no second quality accepted, even though a blemish may not affect quality or flavor, they say.

"Chicken carcasses are supposed to be cooled to 40 degress for a certain length of time in a specified number of gallons of water per bird," says Nan. "That's federal regulation. If the processor uses too much water, too much energy will be used to cool the birds to the proper temperature. This accounting model pinpoints such mismanagement instances."

And speaking of regulations, their development and update often don't keep up with new developments in the food industry, the Unklesbays found. Because the industry needs to improve its ability to forecast food supplies, production scheduling and distribution, foods often have to be cooled for long periods at the temperature federal standards require. Additionally, they advocate research to determine whether recommended temperatures could be slightly changed without damaging food quality.

But for now, comparing the energy efficiency of menu items would be an injustice to the food industry, the Unklesbays say, until it employs energy accounting for all its products. To bring that time closer, they are ready to expand their study to include both direct and indirect costs, other foods and the major varieties of food service—fast-food outfits, restaurants, institutional operations.

You can bet the Unklesbays will have a legion of vagrant BTUs tagged by the end of *that* study.

Legislation relating to UM

BILLS	STATUS IN HOUSE	STATUS IN SENATE
SB47—Prevents UM land sales of 500 acres or more without General Assembly approval.	Committee hearing held. Reported "do pass," but amended to 2,500 acres.	Passed.
Senate Substitute for SB152—Requires course in education of exceptional child in order to get life teaching certificate.	Committee hearing held. Reported "do pass."	Passed with emergency clause.
SB389—Establishes a "Missouri Forest Research Council" headquartered at UM.		Preliminary approval given.
HB268—Requires state employes to live in Missouri, with certain exemptions allowed.	Committee hearing held. Reported "do pass."	
House Committee Substitute for HB144 and HB339—Collective bargaining bill for public employes.	Preliminary approval given.	
House Committee Substitute for HB428 and HB602—Creates "Federal Grant Program Fund" in state treasury.	Passed.	Committee hearing held. Reported "do pass."
House Committee Substitute for HB464 and HB670—Collective bargaining bill for public employes, including teachers.	Committee hearing held. Reported "do pass."	

The table reflects the status of various bills as of May 6. Additional information may be obtained from Mrs. Marilyn Selovich, 309 University Hall, Columbia (65201); ph. 314/882-4355.