

INTERNATIONAL ANIMAL AGRICULTURE

535 Animal Science internships in Thailand. P. O. Brackelsberg*, K. P. Carter, K. R. Larson, J. L. Shannon, and K. R. Sieren, *Iowa State University, Ames.*

The educational value of internships in other countries has numerous benefits to the student participant, his/her prospective employer(s), and to the students' classmates and professors. Increasing global awareness has been emphasized in many curricula as attempts are made to have graduates better prepared for employment. The purpose of this paper is to describe how a one-way internship was broadened into a two-way exchange of students from Thailand to Iowa and from Iowa to Thailand. Initially, the International Agriculture Program (IAP) office was asked to make arrangements for six-month farm internships for several junior or early senior students from Kasetsart University (KU), Kamphaengsaen Campus. The success of the first group of students from Thailand was followed by a second request, and the director of IAP asked if it could be made into a two-way exchange. KU contacted Chavoeng Pokphand Corporation (CP) and received an enthusiastic "yes". A three-way agreement has recently been signed among CP, KU, and ISU that will continue through 2001. Thai students have lived and worked on individual family owned and operated livestock farms in northeast Iowa, and Iowa students have lived and worked on commercial duck, chicken, turkey and pig farms in Thailand. Both Universities serve as hosts and they provide orientation programs before the work experience begins. In Thailand, the ISU students also traveled to and learned about the extensive and highly successful rural development projects in the northeast of Thailand. These development projects have been three-way partnerships among the farmers in a region, the King of Thailand, and the CP corporation. The success of the projects have earned the King of Thailand a special award from the United Nations. The ISU internship students wrote a five-chapter book titled, *Thailand 1997—The Experience of a Lifetime*, to give a lasting memory of their experience, to thank those who made the internship possible, and to help encourage and prepare future students for an internship experience in Thailand.

Key Words: Internships, Study abroad, Animal science

536 International internships in animal agriculture. D. M. Kinsman, *University of Connecticut, Storrs.*

In today's competition and demand for livestock and animal products on a global basis it becomes increasingly important that we provide our Animal Science students with exposure to and experience in an international dimension. Doubtless the best way to do so is to have our students work abroad on farms, at animal research centers, with industry or in conjunction with foreign agricultural services or U.S. companies having international agricultural trade. The Animal Science Department of the University of Connecticut has during the past 20 years arranged for 90 of its students to work for periods of two or three months to a full semester or even a full year in 20 countries on four continents. Although the majority have been in Australia (15) and Germany (16), there have been eight in Finland and eight in Switzerland with fewer numbers in France, Ireland, Portugal, the Netherlands, Norway, Russia, Sweden and the UK. New Zealand, India and Ireland have hosted a few as well. Generally the student provides his/her own transportation while the host provides housing and meals and perhaps a small salary. Usually the students participate after their junior year although some go earlier or later. Some graduate students avail themselves to this inspirational opportunity, also. There is no question about the value and rewards of this experience. A number find very satisfying career opportunities and are made the more marketable by their international involvement. Admission to graduate or veterinary school is greatly enhanced by their international record. Some participate for credit whereas most do it for the experience alone, combined with the cultural, language and travel opportunities. Our Animal Science programs need to provide these wider horizons and extended options. The whole world is our campus today. Think globally, act locally!

Key Words: International, Internships

537 Oregon State University's strategy to internationalize its undergraduate curriculum. N.E. Forsberg*, *Oregon State University, Corvallis.*

Oregon State University has developed two new strategies to internationalize its undergraduate curriculum. The rationale for these efforts is that Oregon sits on the Pacific Rim and it is economically important for our undergraduates to have knowledge of other cultures. And, as citizens of the world, we want our undergraduates to understand more than their primary culture. The International Degree Program is a novel concurrent baccalaureate program in which students are expected to Study Abroad, complete a mentored Senior Thesis, learn a second language and take four extra classes in international issues. Currently, 95 students are enrolled in the program with most interest among students in environmental sciences, business and science. One student from Animal Science has graduated from this program and is now in veterinary school. The second program is an International Internship program (Global Graduates) where OSU staff place undergraduate and graduate students in work situations at various sites around the world. The goal is to place 50 students per year and to have the students return with practical international experience which will benefit Oregon's economy. Details of both programs will be discussed.

Key Words: international, International Degree, Global Graduates

538 Experiences in teaching international animal agriculture: Background, course design, and student response. S. D. Lukefahr, *Texas A&M University-Kingsville.*

Students who major in Animal Science at U.S. institutions are generally exposed to a curriculum that emphasizes commercial, large-scale production of the few traditional food animal species: cattle, chickens and turkeys, sheep, and swine. Globally, most farmers live in lesser developed countries under limited-resource conditions of land, feed supplies, equipment, and capital. The promotion of commercial animal production enterprises may not be appropriate for such farms because it can subject the farmer to considerable economic risk. Rather, use of small livestock (e.g., goats, rabbits, guinea pigs, and Muscovy ducks) or local breeds of chickens, sheep, and swine, which are regionally adapted and thrive under small-scale, subsistence conditions, may be more appropriate for the next century. In this global context, a course in international animal agriculture has been taught for over 10 years to undergraduate and graduate students. The course consists of two parts: 1) a review of traditional and potential livestock species well suited for impoverished families on small farms, and 2) a study of how to develop sustainable livestock projects involving feasibility, design, implementation, monitoring, and evaluation stages. Use of personal audio-visual materials and those from humanitarian organizations (e.g., Heifer Project International and World Neighbors) are shown to students in each class session. Global food issues and challenges are illustrated with actual examples to enhance student understanding. Selected literature readings are assigned each session, and discussed in the next session. A term paper is also assigned whereby students choose three suitable livestock species or breeds which would be complementary on a small crop farm (<10 acres) where a family of ten earns only 1,500 dollars per year. Daily dietary intake of animal protein per family member is calculated. Itemized enterprise budgets (costs and returns) and production tables are prepared. Students gain a broad appreciation and understanding of global animal agriculture and the complexity of food production and hunger issues.

Key Words: International Animal Agriculture, Teaching, Appropriate Technology

539 Per adult human unit versus per capita, a new approach in evaluating the production, consumption and distribution of food commodities throughout the world. S. Hasimoglu*, *Continental Analytical Services Inc., Salina, KS.*

The work performed by many national and international scientific institutions, the data gathered and evaluated for food production and consumption have traditionally been presented on a "Per Capita" (PC) basis. PC is defined as "equal to each individual, per unit of population, for each person." When data are presented on PC basis for consumption and production of food commodities, the assumption must be made that a 6-month-old baby will produce and consume as much as a mature person. Aiming to reduce the magnitude of errors inherent in PC projections, two criteria were considered to develop more meaningful measures of "Per Adult Human Unit" (PAHU), which allows standardization of a nation or defined population (target groups). The two criteria are the structure of a given population and the dietary needs for maintenance of the energy intake for the basal metabolic body sizes (BMR) of the age groups. The calculation method of the PAHU has been based on the inclusion of sex and all age groups (0-75+). The calculated PAHU conversion factors for each age group to standardize any population are presented. The unintended, faulty and deleterious assessments between PC and PAHU are found not to be less than 14.3 percentage units. The calculation of the USA's PAHU showed that consuming or producing 239.2 million PC population was reduced to standardized 199 million PAHU and the difference was 16.81 percentage units. PAHU and PC evaluations on the annual grain and meat requirements of the equally populated developed and developing countries showed significant differences. The conclusion is that PC estimates of the food commodities consumption and production, with disregard for population distribution can be faulty. Application of PAHU to food consumption data would improve the data validation process by providing an alternative to currently "one-size-fits-all" (PC) accept or reject approach that is faulty and not technically defensible.

Key Words: Per Adult Human Unit, Per Capita

540 Competitiveness of Brazilian dairy sector. G. M. Calegar*, *Embrapa - National Dairy Cattle Research Center, Juiz de Fora-MG-Brazil.*

The future of Brazilian dairy sector has been subject to several studies and meetings, mainly during the second half of this decade. The main issues of interest that have been discussed include: the trends that should follow the cost of milk production, the different types of milk production systems that should prevail in each ecological region of Brazil in the years to come, the efforts to improve milk quality, the unfair competition of imported milk, and the negotiations among producers, processors and other private and public institutions, in order to reach a better coordination of the actions that should perform each agent of the sector. The objective of this study was to identify the main institutional and policy constraints, which have prevented a better competitive performance of the sector. Primary and secondary data were collected from different sources and analyzed under the principles of the new theory of institutions and policy analysis. The results indicated that the competitiveness of the sector is constrained by factors, such as: low quality of dairy products, high production cost, poor training of managers and laborers, lack of coordination among the agents who work in the sector, large number of small traditional milk producers, who are somehow opposed to technological and institutional changes, misleading private and public policies which have facilitate subsidized imports of milk products, restricted availability and high interest rates of credit to producers, poor performance of the cooperative system, obsolete legal framework regarding quality standards of milk products, oligopsonic market for milk and relative high production and price instability at producers level. To handle this situation, it was recently created a new producers organization, named "Leite Brasil", which seeks to defend their interests through negotiations with cooperatives, industries and government institutions linked to the dairy sector. However, this organization is facing some difficulties to collect a monthly fee per liter of milk delivered, from its members, because of lack of cooperation of some processors, that have refused to take that fee from the total revenue received by producers. Moreover, the Government is moving slowly in the process of establishing new quality standards and of avoiding subsidized imports of milk products. These restrictions have prevented the improvement of the quality standards of Brazilian dairy products.

Key Words: Brazilian Dairy Sector, Competitiveness, Policy Analysis

541 Potential to increase milk yield in tropical countries with indigenous dairy cattle: The Sahiwal model. C. W. Talbott*¹, M. Z. Zaman², R. E. McDowell³, and B. T. McDaniel³, ¹NC A and T SU, Greensboro, NC, ²Livestock Production Research Center, Okara, Pakistan, and ³NCSU, Raleigh.

Data from Sahiwals were collected in the Province of West Punjab, Pakistan, the area in which the breed is thought to have originated. Records from January 1, 1974 to December 31, 1989 were utilized to study growth characteristics of heifers, and production and supporting traits of cows. Two samplings of the Sahiwal data were used. Breeding values and heritabilities for growth or lactation traits were from 1771 Sahiwal heifers and 632 lactating cows. Least square and animal model estimates were obtained from a combined data set containing all Sahiwals and records of Sahiwals crossed with Holstein, Jersey, and Swedish Red and White breeds (714 heifers and 627 lactating cows). Average daily gains from birth to 3 and 12 mo for Sahiwals were .32 and .30 kg/day respectively; development ratios (ratios of change between weighings) were characteristic of the slow maturing potential of the *Bos indicus*. Heritabilities for early growth traits were low, but higher for heavier weights. Thirty percent of all heifers were removed for involuntary causes by 36 mo. Least square mean for age at first calving was 39.7 mo. Environmental factors accounted for 13.1% of the phenotypic variance for milk yield in the Sahiwal; 4.6% of the variance was attributed to sire. Based on estimates of genetic trend during the birth years of 1974 to 1985, there was no indication of improvement in additive merit for milk yield. Estimates of heritability (18.5% from multiple records) and total phenotypic variation for Sahiwal milk production (396,234 kg²), would further suggest limited progress is obtainable from standard selection methods. Predicted breeding values for 26 Sahiwal bulls (>5 daughters and representing 94% of all records) from animal model analysis ranged from +429 to -1164 kg; females ranged from +548 to -835 kg. Sire and within sire variance decreased substantially when records were extended to 305 days, suggesting that milk yield and days in milk may be controlled by similar genes.

Key Words: Sahiwal, Tropical Dairy Production, Genetic Evaluation

542 Grazing behavior of purebred Holstein-Friesian and crossbred Holstein-Sahiwal dairy bulls under tropical conditions. J. M. Matias*, *Dairy Training and Research Institute, University of the Philippines, Los Banos, Philippines.*

Suitability of introduced livestock is best assessed by analyzing the actual performance in the specific location and conditions. This study was conducted to compare the behavior of grazing purebred Holstein-Friesian and crossbred Holstein-Sahiwal dairy bulls and identify factors that contribute to performance ability. A total of 35 dairy bulls (18 purebreds, 17 crossbreds) were used in the study following a 2x3 Factorial Experiment Design with the two breeds and three grazing periods (0700-1000h, 1000-1400h, 1400-1700h) as factors. Behavioral observations were done in a mixed-grass pasture lot dominated by stargrass (*Cynodon plectostachyus*) every half hour and the frequency of grazing, standing, lying down, walking, ruminating and drinking were noted. Furthermore, respiratory frequency was also monitored. Mean temperature and humidity values in the pasture were 31.4C and 54.5%, respectively. Average windspeed of 6.1 kph and zero rainfall were also noted. Significant results were obtained in grazing, walking, standing and lying down behavioral activities among the three grazing periods but not between breeds. However, both purebreds and crossbreds were found to graze more in the open than in the shade during the hottest time period, i.e. 1000-1400h. Frequency of rumination in purebreds was not significantly different from crossbreds but respiratory frequency was found to be higher in purebreds and varied significantly among the three grazing periods.

Key Words: Behavior, Grazing, Dairy Bulls

543 Some results of Hereford and Simmental crossings in Hungary. F. Szabo and I. Marton, *Pannon University Keszthely, Hungary, Hungarian Hereford Association, Kaposvar, Hungary.*

Specialization for dairy and beef herds and decrease in the number of the original dual-purpose Hungarian Simmental herds started in early 70s in Hungary. From that time more and more farms started to deal with beef cattle production. Some beef cattle breeds as a Hereford in the highest number, and some other breeds in lower number as the Lincoln Red, Limousin, Charolais, Aberdeen Angus, Blonde d'Aquitaine and Belgian Blue were imported to Hungary. The study were conducted in three ranches that managed Hereford (HE), Hungarian Simmental(HS) and their crossing (F1 and R1 generations) together among the same conditions. Cows were kept on peat bog soil pastures in summer, fed with hay and silage in winter. Their service was in summer and spring calves were weaned in fall. Reproductive performances of the mentioned genotypes and rangeland productivity were evaluated and compared for ten year period based on the data of more than 3700 cows. The results show that the sustainable heads of animals per 100 ha of pasture area was the highest in the case of Hereford and the lowest in case of Hungarian Simmental. Reproductive performance and survival rate was higher in case of crossbred herds. The average weaning weight of calves adjusted to 205 day of age was highest in Hungarian Simmental (193 kg) and lowest in Hereford (181 kg) population. F1 was the best both in respect of number and the total weight of weaned calves per unit of pasture area.

Genotype	HE	75%HE 25%HS	50%HE 50%HS	HS
Sustainable heads of cows per 100 ha of pastures	96	94	94	80
Calving rate, %	86	87	91	79
Calves weaned, %	78	80	86	75
205-day weaning wt, kg	173	181	189	193
No of calves weaned per 100 ha	75	75	81	60
Wt of calves weaned per 100 ha, ton	12.98	13.58	15.31	11.58

Key Words: Sustainable Number, Reproduction, Weaning Results

544 Impact assessment (*ex ante*) of introducing Tuli cattle to an integrated beef cattle system transcending the U.S.-Mexico border. P. Fajersson^{*1}, S. de los Santos², B. Warrington¹, J. W. Holloway¹, and R. Randel^{3, 1,3} *Texas A&M University Agricultural Research and Extension Centers, ¹Uvalde and ³Overton, ²INIFAP, Tamaulipas (Mexico).*

African Tuli cattle have potential for stress adaptation and desired carcass characteristics. Introducing Tuli and modifying beef cattle production in sub-humid tropical tamaulipas is hypothesized to permit producers to target quality beef markets in Mexico and the U.S. The objective here, was to estimate impact of F₁ Tuli vs F₁ Fleckvieh progeny on 3 systems. Divided on 11 ranches, 240 crossbred females have been bred with Tuli (n=120) or Fleckvieh (n=120) using 10 bulls per breed. All heifer calves (n=120) will be grazing through 2nd calving and 2 steers per sire (n=40) to slaughter. A local Mexican feedlot will be started using 1 steer per sire (n=20) after backgrounding. The rest (n=60) will be backgrounded and finished in Texas. For the forecast, data for F₁ Fleckvieh were extrapolated from existing Mexican information, TAMU at Overton for the Fleckvieh export phase and Uvalde and MARC, Nebraska, for F₁ Tuli. Growth, reproductive, slaughter and carcass data were used and economic performance analyses calculated. In the projection, adaptation and size of F₁ Tuli compared to F₁ Fleckvieh females (405 vs 460 kg) would make Tuli more likely to maintain a high rate of weaned calves (105 vs 120 kg/cow exposed) during climatically adverse years, thereby decreasing production risks. For steers, F₁ Fleckvieh would be larger and preferred to F₁ Tuli (545 vs 480 kg) on the weight-based Mexican market. Feedlot intensification would be expected to favor Tuli to Fleckvieh steers (65 vs 40% choice estimated), due to a quality beef niche provided by Tampico city. Fleckvieh steers, foreseen to exceed Tuli at weaning (220 vs 185 kg), would initially be at an advantage for export. Once expected characteristics of Mexican Tuli carcasses are recognized, competition is anticipated. Initial forecast indicate, that crossbred Tuli cattle would improve productivity by increasing sustainability of the systems and contribute to high quality beef production and export of steers.

Key Words: Impact Assessment, Tuli Cattle, Production Systems

545 Meat quality characteristics of loin eye and tenderloin muscles of male Korean native cattle. K. H. Kim^{1*}, Y. S. Kim², Y. K. Lee¹, and M. G. Baik^{1, 1} *Chonnam National University, Kwangju, Korea and ²University of Hawaii at Manoa, Honolulu, USA.*

Korean consumers prefer beef from Korean native cattle to imported beef, probably due to differences in palatability characteristics. Not much data, however, is available explaining factors affecting palatability characteristics of the beef from Korean native cattle. This study was designed to investigate meat quality characteristics of Korean native cattle, and some biochemical and histochemical factors affecting meat quality characteristics of Korean native cattle. Five bulls weighing about 550 kg were slaughtered, then 20 g of loin eye (LE, 12th rib) and tenderloin (TL) samples were collected at 0, 2, 6, 12, and 24 hr postmortem to measure the changes in metabolites, concentrations, and pH. The next day 1 cm³ of LE and TL samples were cut for histochemical analysis. Samples of LE (between 6th and 12th rib) and TL were also prepared for shear force measurements at 1, 3, 7, 14, 21 d postmortem by preparing three 1.8 cm diameter cores from 2.54 cm thick steaks that were vacuum packaged and cooked in water bath at 70°C. ATP and pH in TL declined faster (p<0.05) than those in LE during the 24 hr postmortem period, and remained lower at 24 hr after slaughter (0.7 vs 1.4 μmoles/g muscle, 5.61 vs 5.87). Glucose-6 phosphate in TL increased faster (p<0.05) than in LE muscles, and remained higher (11.0 vs 7.7 μmoles/g muscle). Glycogen in LE declined faster (p<0.05) than in TL, and remained lower (5.9 vs 9.0 mg/g muscle). TL tended (p=0.7) to have lower type IIB proportion than LE (15.9% vs 29.5%). The shear force required to cut LE was significantly higher than for TL at 1 d, but no difference was observed at 21 d postmortem. In summary, this study demonstrated that the postmortem changes of metabolites, concentrations, pH, fiber type composition, and degree of aging differ between the LE and TL muscles of Korean native cattle.

Key Words: Korean Native Cattle, Meat Quality

546 Feed intake and nitrogen metabolism of growing sheep fed with Acacia mangium. T. Clavero^{*} and R. Razz, *Universidad del Zulia, Venezuela.*

Confined West African sheep were offered chopped dry Acacia mangium leaves at levels of 0, 20, 40 and 60% in a diet with chopped hay of Brachiaria humidicola over a period of 21 days to evaluate intake and nitrogen metabolism. The experimental design was a randomized block with four replications. Dry matter intake (DMI) was affected by Acacia feeding (P<0.05). DMI increased with increasing level of Acacia in the diets. The corresponding DMI values were 2.2, 2.8, 3.5 and 4.1 kg per 100 kg LW. Acacia mangium supplementation had a highly significant (P<0.01) effect on nitrogen utilization by sheep. Nitrogen intake and percent of nitrogen apparently retained rose with increasing levels of Acacia. Nitrogen retention was negative for unsupplemented sheep but positive for Acacia-mixed diets.

Key Words: Acacia Mangium, Nitrogen Metabolism, Feed Intake