

mated to determine germ line transmission. The frequency of germ line chimeras ranged from 13 to 100%. Three lines always gave rise to germ line chimeras. The frequency of germ line transmission varied between lines and ranged from 0 to 41%. The results of this study confirm that

cell lines of germ line stem cells can be established from chicken PGCs and can only give rise to fully functional gametes.

Key Words: stem cells, avian, primordial germ cells

Production, Management and the Environment: General

W208 Biodegradation of genetically modified seeds and plant tissues during composting with manure. T. Reuter*¹, T. W. Alexander¹, K. Stanford², and T. A. McAllister¹, ¹*Agriculture and Agri-Food Canada, Lethbridge, AB, Canada*, ²*Alberta Agriculture and Rural Development, Lethbridge, AB, Canada*.

The increasing global market volume of genetically modified (GM) crops amplifies the potential for environmental impact and/or non-conformance with legislation. Methods proposed for disposal of crop residues should be assessed to prevent unintended distribution of GM materials. Composting is an inexpensive and location-independent option. To determine the effectiveness of composting for disposal of GM plant material, seed viability tests and molecular techniques were used to assess degradation during the composting process. Replicate samples of corn seeds, alfalfa leaves, and GM canola seeds, meal and pellets in sealed nylon bags were implanted into duplicate feedlot manure compost piles and collected periodically during 230 days of composting. The compost piles (25 m × 5 m × 2.4 m; L × W × H) each had initial weight of approximately 85,000 kg. Canola and corn seeds lost germination capacity after 7 days of composting at temperatures exceeding 50°C. Using PCR, plant-specific DNA fragments (882 bp) could be detected in meal and pellets, and in manure samples from random sites in the pile for up to 56 days, whereas those fragments in seeds and leaves were detectable for up to 230 days. Real-time PCR revealed small (<200 bp) plant- and GM-specific fragments in decreasing quantities up to 230 days in all samples. Southern blotting assessment of genomic DNA extracted from canola seeds verified differences in the persistence of intact Rubisco-, 16S- and GM-specific genes during composting. Composting GM and non-GM plant materials with manure resulted in inactivation of germination, and efficient, though not complete, DNA degradation. This study indicates that dissemination of viable GM seed or functional transgenes would be highly unlikely following composting of GM plant material.

Key Words: compost, genetically modified, viability

W209 Arrangements of *Acacia decurrens*, *Acacia melanoxylon* and *Alnus acuminata* as silvopasture systems in a high tropic ecosystem. A. Conde*¹, L. L. Betancourt¹, C. J. Jaramillo¹, A. Umaña¹, D. Barrera¹, and D. R. Chamorro², ¹*Universidad de La Salle, Bogotá, Colombia*, ²*Corpoica, Bogotá, Colombia*.

The objective of this study was to evaluate dasometric measures during establishment period and initial effects on soil and the availability and quality of grass in silvopasture arrangements: live fences and tree dispersed in pasture in high tropic in Colombia. Three species of trees were planted in a hill pasture with *Pennisetum clandestinum* near to Sopo, Colombia (73° 57' O, 4° 54' N), 2580 meters mean altitude, 14 °C, mean rainfall 693 mm/yr, in two arrangements: A) Single row of two meters spaced trees like live fence and B) Dispersed Trees in pasture 10 x 5 m each line with one specie. Dasometric measures were: average height, basal diameter and diameter at 40 cm height, Three treatment were imposed: 1) *Acacia decurrens* (Ad) 2) *Acacia melanoxylon* (Am) and

3) *Alnus acuminata* (Aa) in a randomized complete block design with 6 replicates. Changes on soil and availability of forage and its quality was measured. Best growth were achievement for Ad and Am compared with Aa (p<0.05). In all dasometric measures were not differences between Ad and Am but *Alnus acuminata* showed lower means values than acacias (p<0.05). Pastures with trees did not show differences in chemical characteristic in soil compared with pastures without trees. Availability of forage was higher in pastures with trees dispersed 10x5 (720 g of dry matter/m²) compared with pastures without trees (649 g of dry matter/m²). Carbohydrates and protein fractions in grass did not report differences with or without tree into the pastures (p>0.05). Based in dasometric measures *Acacia decurrens* and *Acacia melanoxylon* had faster growth and best performance than the native *Alnus acuminata* in the reported ecosystem. The long term effects of planting trees in nutrient quality of grass (protein a carbohydrate fractions) and soil characteristics may become cumulative and need further research.

Key Words: silvopastoral systems, carbohydrate fractions, protein fractions

W210 Influence of *Acacia mangium* on soil chemical characteristics in a silvopastoral system in northwestern Venezuela. T. Clavero* and R. Razz, *Centro de Transferencia de Tecnología en Pastos y Forrajes, Universidad del Zulia, Maracaibo, Estado Zulia, Venezuela*.

Acacia mangium (L.) Willd is an important multipurpose tree of traditional agroforestry system in tropical semi-arid regions. Understanding the changes in soil properties in silvopastoral system is important in regulating the interactions between trees and understorey pastures. In this study, the influence of *Acacia mangium* on soil chemical characteristics under *Brachiaria humidicola* pastures in northwestern Venezuela was studied. The trees were seven years old at the time of the study. Transects extending from the tree trunk to open grass areas were established, and two soil depths (0-15 and 15-30 cm) samples were taken at 25 and 150% of the average canopy radius (4.5 ± 0.30 m) at five sites. A randomized block design was used with five replications. Soil analyses showed no significant differences (p ≥ 0.05) in Na, Ca, K and pH under tree canopy compare to open pastures. Higher levels of soil C, N, P, Mg (p ≤ 0.05) were found under *Acacia mangium* canopies as compared to open grass areas. Soil organic carbon content was higher by 38% in silvopastures than in adjacent open pastures. Soil organic carbon and N were maximum in 0-15 cm (0.88% and 150 mg/soil kg, respectively) and declined with the depth of soil. Total and mineral P contents were nearly uniform across the depths. Net mineralization rates were higher in silvopastoral system due to greater input of soil organic matter associated with higher soil biological activity from decomposition of litter and dead tree-roots. It was concluded that the incorporation of *Acacia mangium* in *Brachiaria humidicola* pastures improved soil chemical conditions.

Key Words: *Acacia mangium*, *Brachiaria humidicola*, silvopastoral

W211 Discrimination and classification of the new co-products from bio-energy production using infrared spectroscopy with multivariate techniques-AHCA and PCA: Comparison among blend DDGS, wheat DDGS and corn DDGS and between wheat and wheat DDGS, and corn and corn DDGS. D. Damiran and P. Yu*, *College of Agriculture and Bioresources, University of Saskatchewan, Saskatoon, SK, Canada.*

Dramatic increase in bio-ethanol production has resulted in different types of new co-products: wheat dried distillers grains with solubles (DDGS), corn DDGS, and blend DDGS. There is an urgent need to quickly understand molecular structural profile in these co-products. The objective of this study was to investigate molecular structural features of the new co-products from Bio-energy product using infrared spectroscopy with two multivariate spectral analysis techniques as a novel approach: agglomerative hierarchical cluster (AHCA) and principal component analyses (PCA) and compared among blend DDGS, wheat DDGS and corn DDGS, wheat and wheat DDGS, and Corn and Corn DDGS. The results show that by application of these two multivariate techniques of AHCA (Distance method: Euclidean; Cluster method: Ward's algorithm) and PCA with the infrared spectroscopy, it makes possible to quickly discriminate and classify the inherent molecular structural features among the different types of DDGS and between wheat and wheat DDGS and between Corn and Corn DDGS with a great efficiency, in the fingerprint region of protein amide I and II ca. 1720-1484 cm^{-1} . The DDGS and feedstock inherent structures can be grouped in separate ellipses. The first principal component explained > 90% of the total variance. Information from this study may provide a further insight as to why DDGS exhibit different biodegradation behaviours and nutrient availability in animals.

Key Words: classification and discrimination of molecular spectra, co-products from bio-energy production, DDGS

W212 Biochemical profile of Maguey silage. G. Álvarez-Fuentes*, J. C. García-López, J. M. Pinos-Rodríguez, Y. Jasso-Pineda, and F. M. Tristán-Patiño, *Universidad Autónoma de San Luis Potosí, San Luis Potosí, SLP, México.*

With the aim of characterize silage maguey alone and mixed; pH, hemolytic activity of maguey saponins, humidity percentage, dry matter, color and smell was measured of silage maguey alone and mixed with alfalfa and mezquite pod. Five maguey silages were elaborated in micro silos in glass bottles 10 cm diameter wide and 25 cm high, each treatment with five replicas: Maguey 100% (E1); Maguey 90% and mezquite pod 10% (E2); Maguey 50% and alfalfa 50% (E3); Maguey 40% and alfalfa 60% (E4); Maguey 33.3%, alfalfa 33.3% and mezquite pod 33.3% (E5). The first four maguey silages had higher humidity levels; E1 90.2%, E2 82%, E3 81.2%, E4 82.7% and E5 58.4%, there were statistically different ($P < 0.05$), E1 and E5 were different to the rest of treatments. There were no differences ($P > 0.05$) for pH 3.9, 3.7, 3.7, 3.6 y 3.7 values for each treatment, respectively. Regarding quality such as color there were green to light green; and the smell was like lactic acid, characteristic of good silage procedure. There was a decrease in the hemolytic activity of saponins observed in the first hours of fermentation and disappear through the time. It is concluded that silages made of maguey are not affected by high humidity content, and that maguey can be used combined with other forage with not optimum characteristics for silage.

Key Words: silage, maguey, saponins

W213 Copper and zinc accumulation in dairy production systems. T. Downing*, K. Stiglbauer, M. Gamroth, and J. Hart, *Oregon State University, Corvallis.*

Dairy farmers often use either CuSO_4 or ZnSO_4 solutions in footbaths to control diseases of the hoof. Solutions are frequently changed before each milking requiring significant quantities of Cu and/or Zn a year. Used solutions are dumped into the dairy manure handling system and applied to fields in their liquid manure system. The objectives for this project were to survey 30 dairy farms in Oregon to estimate the amount of CuSO_4 and ZnSO_4 used in footbaths, measure mineral concentrations in soils on the farm, access the concentration of Cu and Zn in the manure system and measure minerals in the forage produced on the dairy. Footbath practices were recorded for each dairy. Soils samples were collected from two major fields at 15 cm deep and analyzed for Cu and Zn. Forages grown on the farm were sampled and analyzed for Cu and Zn and manure was collected directly from milk cows and from the liquid manure storage system. Forages, soils and manure were all analyzed at Agri-Check Labs, Umatilla, OR. Footbath usage by farm ranged from no usage to continuous usage. Soil Cu concentrations ranged from .7 to 34.7 ppm and averaged 5.7 ± 6.6 . Soils Zn concentrations ranged from .6 to 41.8 ppm averaging 10.1 ± 9.3 . Copper concentrations in forages ranged from 1 to 10 ppm averaging 3.4 ± 2.1 and Zn ranged from 3 to 51 ppm averaging 13.8 ± 10.3 . Manure Cu concentrations directly from milk cows were very consistent typically at 10 ppm with Cu concentrations in the manure storage ranging from 2 to 58 ppm averaging 10.3 ± 12.02 ppm. The use of CuSO_4 and ZnSO_4 in footbaths on dairies in Oregon continue to a common practice. Over 75% of dairy soils tested are considered high (>2ppm) in Cu concentration and 38% were extremely high (>5ppm). Using CuSO_4 and ZnSO_4 in footbaths is creating potential long term environmental and cropping challenges on many Oregon dairies.

Key Words: footbaths, copper sulfate, zinc sulfate

W214 Growth performance, carcass yield and economical evaluation of two genotypes of quails under two housing systems. D. Cardoso-Jiménez¹, R. Rojo-Rubio¹, A. Z. M. Salem^{*1,2}, S. Rebollar-Rebollar¹, J.L. Martínez-Benítez¹, and J. Hernández-Martínez¹, ¹*Centro Universitario UAEM-Temasaltepec, Universidad Autónoma del Estado de México, Toluca-Tejupilco, Estado de México, México,* ²*Department of Animal Production, Faculty of Agriculture (El-Shatby), Alexandria University, Alexandria, Egypt.*

Two genotypes of quails (*Coturnix coturnix japonica*) of Japanese (JAP) and *Coturnix coturnix japonica* variety Jumbo (JUM)) were evaluated for growth performance and carcass yield as well as the economic efficiency, reared in floor (F) or cage (C) housing systems. Eighty four quails (~58g) of each genotype of one week of age (both sexes) were used during the 19 days of the experimental period reared in the two housing systems. Quails were randomly assigned in two groups of bi-factorial experimental design (2 genotype x 2 housing systems, of 42 chicks for each group). At the end of the experimental period, all animals of each group were slaughtered (7 repetitions of each) for the carcass yield measurements. Feed intake (DMI) was increased in all quails groups except in JAP reared in F versus C system ($P = 0.001$). Overall, DMI was increased ($P = 0.032$) in quails reared under C versus F system. ADG was improved ($P = 0.011$) in JUM of the F system than the other quails groups, although the final BW was not affected ($P = 0.477$) under the two rearing systems, as an overall mean. Overall, the Average daily gain (e.g. ADG) was higher (7.52 vs. 4.7; $P = 0.0117$) in JUM versus JAP birds. Consequently, Feed conversion ratio (e.g. FCR) was improved (3.35 vs. 3.8; $P = 0.0001$) in JUM versus JAP quails reared in both hous-

ing systems. Carcass yield were not affected ($P=0.327$) neither by the genotype nor the housing system during the experiment, although and C system was cheaper than F system for the both genotypes. Reared quails in cages were more profitable and comfortable for quails that appeared a better animal growth performance (e.g. final BW, ADG and FCR), while best improvement in bird growth performance was in JUM versus JAP under the two housing systems.

Key Words: quails, housing systems, growth performance

W215 The effects of management and environmental factors on broiler breeder performance in Iran. H. Hosain^{*1}, M. Moradi Sharbabak², A. Noshari¹, M. Zaghari², and M. B. Zandi², ¹Tehran Azad University, Karaj, Tehran, Iran, ²University of Tehran, Karaj, Tehran, Iran, ³Young Researchers Cloob, Sanandaj, Kurdistan, Tehran.

In order to study the effect of management and environmental factors on coob strain data from 40 herds of broiler breeder under different environmental condition of Iran were analyzed. The chicken traits were measured including the persistency of peak production and total chicken production. The management and environmental factors such as the percentage of uniformity in body weight (age of 20 weeks), age and weight at the end of uniformity stage, the same and to be difference in age (all-in all-out), altitude, to be separate hen and cockle in growing period or to be joint, the number of birds in unit area and the feeder and watering area were investigated. The GLM procedure of SAS software (2002) was used for analyses. The results showed that management factors such as the percentage of body weight uniformity, age and weight at the end of uniformity stage, all-in all-out, feeding area have significant effects ($P<0.01$) on performance traits of broiler breeder. Altitude from sea level as a environmental factor has significant effect on chicken production ($P<0.01$) and the production persistency ($P<0.05$) too. The number of birds per unit area has significant effect ($P<0.01$) on performance traits. Moreover under growing period if hens were with cockle the performance traits were higher ($P<0.1$).

Key Words: environmental factors, altitude, Coobstrain

W216 Effects of stocking rate of weaned to finishing pigs on bermudagrass ground cover. S. Pietrosemoli^{*1}, J. T. Green², and R. Vibart³, ¹Animal Science Department, North Carolina State University, Raleigh, ²Crop Science Department, North Carolina State University, Raleigh, ³AgResearch Limited, Grasslands Research Centre, New Zealand.

Management of outdoor pig operations presents environmental issues such as the deterioration of vegetative ground cover, soil disturbance, and high nutrient loads. Vegetative ground cover ensures that nutrients from swine excreta are held within the soil and plants and kept from leaching or flowing to surface waters. At the Center for Environmental Farming Systems in Goldsboro, NC, 60 purebred Yorkshire female and castrated pigs (18.4 and 118.5 kg initial and final BW, respectively) were used to evaluate the effects of stocking rate (SR) on soil and vegetation disturbance. The trial was conducted for 91 d during summer 2008 in a mature (> 10 years) bermudagrass (*Cynodon dactylon*) pasture. Five hogs were randomly assigned to each of twelve paddocks sized to equal SR of 37, 74, 111, and 148 head/ha. Wallows, shade, feeders and nipple waterers were provided at fixed locations within each paddock. Animals had *ad libitum* access to concentrate feed. Ground cover was assessed every 14 d using a step-point technique with transect lines evenly

spaced across the plots. The experimental design was a randomized complete block, with three field replicates. Data were log ($\log[x+10]$) and square root ($[\log[x+10]]^{1/2}$) transformed for percent bermudagrass cover (BGC), vegetation cover (VC), and bare soil (BS). Percent BGC and VC decreased linearly ($P \leq 0.001$; 87.4, 78.8, 73.8, 60.4%; and 92.6, 84.8, 79.9, 67.6%, respectively) whereas percent BS increased linearly with increasing SR ($P \leq 0.001$; 7.4, 15.2, 20.0 and 32.4%). Daily gain was not influenced by SR (avg: 0.89 ± 0.02 kg/d). Results suggest that to maintain vegetative ground cover above 80% with continuous access to pasture, stocking rate must be kept below 74 hogs/ha during the finishing phase. In addition, based on observations from this trial, it may be possible to alter vegetative ground cover using a more mobile setting of drinking water, shade and feeders.

Key Words: outdoor pig production, stocking rate, ground cover

W217 Suckling effect on the survival of crossbred goats kids at weaning. L. F. D. Medeiros¹, D. H. Vieira², C. A. Oliveira¹, D. F. Guerson¹, G. M. Fagundes¹, J. P. F. Silveira³, R. S. B. Pinheiro³, V. L. Tierzo³, and J. L. C. B. Reis^{*4}, ¹Rural Federal university of Rio de Janeiro, Seropedica, RJ, Brazil, ²Center of Creation of Animals of Laboratory, Rio de Janeiro, RJ, Brazil, ³São Paulo State University, Botucatu, SP, Brazil, ⁴University of Agrarian Sciences, University of Marília, Marília, SP, Brazil.

Seventy crossbred ($\frac{1}{2}$ Boer + $\frac{1}{2}$ Nondescript breed) goats kids were randomly assigned, from 15 to 90th days of age, in three treatment groups: T1 – kids suckling continuously ($n=26$), the kids stay with there mothers during the day; T2 – kids suckling twice a day ($n=23$), the kids were set with there mothers for suckling during twenty minutes, in the morning and afternoon; T3 – kids suckling once a day ($n=21$), the kids suckling only in the morning, during forty minutes. From 8th days of age the kids stay all night in the shelter separate of there mothers, where received a balanced supplement and water. After 15th days of age the kids had access to the pasture. The survival rate at weaning was 94.36%, with no significant treatment effect ($P>0.05$). Also there was no significant difference ($P>0.05$) based on birth type and sex by the survival to weaning.

Key Words: goats, management, mortality

W218 The effect of Clarify™ larvicide in purchased grains on fly populations on dairy farms in northern Vermont. E. E. Osmanski^{*1}, R. E. Butzler², C. S. Ballard², and C. S. Mooney², ¹The University of Vermont, Burlington, ²William H. Miner Agricultural Research Institute, Chazy, NY.

Reducing fly populations on dairy farms can increase cow comfort and reduce the spread of disease pathogens. The objective of this experiment was to determine the effect of inclusion of diflubenzuron larvicide (Clarify™) in purchased grains on fly populations on dairy farms. Twelve dairy farms were assigned to 6 blocks by herd size, geographic location and lactating herd housing. On treated dairy farms, Clarify™ was added to all purchased grains to achieve an intake of 0.10 mg diflubenzuron/kg BW/d. Control dairy farms were permitted to use all other fly control methods. Each dairy was visited once in each of 10 14-day periods from June to November 2008. Fly populations in lactating herd housing were quantified with fly speck count on 3×5 notecards ($n = 3$ per period) and collection of flies on a sticky trap during walk on predetermined path ($n = 1$ per period). In calf housing, fly populations

were measured using fly speck notecards (n = 3 per period) and on-calf counts (n ≤ 10 per period). Data were analyzed as a randomized block design with main effects of random block, treatment, period, and treatment by period interaction in MIXED procedure of SAS. Period effects (P < 0.01) reflected normal seasonal changes in fly population. With treatment, fly speck counts decreased in the lactating herd housing when compared to control (58 vs. 132 per card, P < 0.02) but an interaction of treatment and period (P = 0.07) increased difference in summer and removed difference after hard frost. Also, total flies collected in lactating herd housing were decreased with treatment (P < 0.01). In calf housing, treatment did not decrease fly populations as measured by fly specks count (200 per card) or flies per side of calf (6.0 flies). The inclusion of Clarifly™ in purchased grains decreased fly populations evident in lactating herd housing but not in calf housing. The lack of effect of Clarifly™ in calf housing is likely related to limited intake of purchased grain during first weeks of life.

Key Words: fly control, dairy cattle

W219 Black soldier fly larvae grown on cow manure. M. Chahine*¹, M. E. de Haro Marti², S. St Hilaire³, O. Pozo¹, and R. E. Sheffield⁴, ¹University of Idaho, Twin Falls, ²University of Idaho, Gooding, ³Idaho State University, Pocatello, ⁴Louisiana State University, Baton Rouge.

The objective of the study was to examine the feasibility of growing black soldier fly larvae on a dairy farm to decrease the volume of manure generated. The study was conducted on a 3000 cows dairy in southern Idaho. Small scale containers using 640-gallon water tanks were

designed so that fresh manure and black soldier fly eggs could be layered. Small ramps that allowed the larvae to migrate when ready to pupate were built in the containers. At the top of each ramp a hole was designed through which prepupae fell into buckets. Other containers used in the study included containers purchased from ESRI International LLC (lab Container) as well as a recycle bin. Prior to initiation of the study, a former structure of manure separator was modified to give shadowed conditions and some wind protection to the larvae. Study was started on June 11 2008. Approximately 1,763,100 eggs were distributed into the three previously mentioned containers. On June 27, the larvae were fed fish offal to stimulate their growth. On July 4 2008, the harvest of the first prepupae started in small amounts. A week later, there was an intensive period of two weeks with 88% of the harvest migrating during this period. Afterward, the harvest decreased dramatically. The shape of the recycle bin container made the migration difficult to accomplish and it was removed from the study. The total harvested quantity from all containers and the floor was 13,238 g, equivalent to around 93,990 prepupae. This value represents only 5.3% of the original population. The large proportion of losses was distributed between immature and dead larvae within the containers. Black soldier larvae reduced manure by 40 percent on a dry matter basis even in less than ideal conditions. The best behavior and development of the larvae occurred when the maximum environmental temperature exceeded 30°C. For better results, it would be important to design a facility that provides stronger protection against rain, wind and low temperature. Even during summer, the wide differences in temperatures between day and night could present challenges for growing black soldier larvae outside without heating in high desert climates.

Key Words: manure, black soldier fly

Ruminant Nutrition: Dairy Calves

W220 The influence of parity, sex and twinning on birth weight of Holstein calves. M. H. Fathi Nasri* and H. Farhangfar, *Department of Animal Science, The University of Birjand, Iran.*

The birth weight of calves is one of the factors affect the calf growth especially before weaning. In this study the effects of dam parity, sex and twinning factors on calf birth weight were evaluated. The birth weight records of 1654 calves born in a large dairy herd during 6 years were analyzed using the SAS Proc GLM according to the following model: $Y_{ijk} = \mu + P_i + S_j + W_k + e_{ijk}$ where Y_{ijk} = the dependent variable, μ = overall mean, P_i = the fixed effect of parity (i = 1 to 9), S_j = the fixed effect of sex (j = 1, 2), W_k = the fixed effect of twinning (k = 1, 2), and e_{ijk} = random residual. Least square means (LSM) are reported and significance is declared at P < 0.05. The effect of parity (Table 1) on calves birth weight was significant. Also the calf sex and twinning effects on calves birth weight were significant, so that the male calves were 3.4 kg heavier than females (42.1 vs. 38.7 kg, respectively) and twins calves were 7.8 kg lighter than single birth calves (32.7 vs. 40.5 kg, respectively). As the birth weight is used as a criterion for genetic selection of candidate replacement calves, these environmental factors are needed to be taken into account in the statistical selection models.

Table 1. The birth weight of calves at different parities

Parity	1	2	3	4	5	6	7	8	≥9
Number	124	349	370	270	197	140	78	59	34
LSM	37.8 ^c	38.7 ^c	39.4 ^b	40.0 ^b	41.3 ^{ab}	41.9 ^a	41.4 ^a	41.4 ^a	41.5 ^{ab}
SD	0.60	0.44	0.40	0.43	0.49	0.54	0.69	0.80	0.98

Means in the same row of Tables with no common letters differ.

Key Words: calf, birth weight, parity

W221 Influence of altering conventional milk replacer feeding rate and protein source on pre- and post-weaning performance and health of dairy calves. D. Carlson*¹, S. Hayes¹, B. Ziegler², R. Larson², M. Raeth-Knight³, G. Golombeski³, J. Linn³, D. Ziegler⁴, and H. Chester-Jones⁴, ¹Milk Products, LLC, Chilton, WI, ²Hubbard Feeds Inc., Mankato, MN, ³University of Minnesota, St. Paul, ⁴University of Minnesota, Southern Research and Outreach Center, Waseca.

Holstein heifer calves (n = 125; 2 to 4 d of age) were assigned randomly to 1 of 4 medicated milk replacer (MR; 20% protein, 20% fat) programs to evaluate the effect of feeding rate and protein source on pre-weaning (d 1 to 42) and post-weaning (d 43 to 56) performance and health. Calves were housed in individual calf pens within a naturally-ventilated barn with curtain sidewalls. Treatments (Trt) were: 1) all-milk (AM) protein MR fed at 0.57 kg/d (powder weight) in 2 daily feedings for d 1 to 35 and 0.28 kg/d 1X daily from d 36 to 42 (AMCON); 2) AM protein MR fed as Trt 1 from d 1 to 14, stepped down (SD) to 0.45 kg/d fed in 2 daily feedings from d 15 to 35, then 0.23 kg/d fed 1X daily from d 36 to 42 (AMSD); 3) Animal plasma (APL) and milk protein MR with additives fed as in Trt 2 (APLSD); 4) Wheat (W), APL, and milk protein MR with additives fed as in Trt 2 (WAPLSD). All MR were reconstituted with water to achieve a 12.5% solids solution. Calves were fed an 18% CP (as-fed) texturized calf starter and had access to fresh water. Average daily gain (ADG) was not affected by MR protein source from d 1 to 14; likewise, neither MR protein source nor feeding rate affected ADG from d 15 to 42 or d 43 to 56. Calf starter dry matter intake (DMI) was similar from d 1 to 14, but greater (P < 0.05) from d 1 to 42 for AMSD (0.41 kg/d), APLSD (0.38 kg/d), and WAPLSD (0.36 kg/d) compared with AMCON (0.29 kg/d). Total MR DMI was greater (P < 0.05) for AMCON (21.1 kg) compared with AMSD (18.5 kg), APLSD (18.4