61 Forage-finished steer performance and carcass characteristics from grazing high-energy forages during the finishing period. Rachel M. Martin*[1], Jason E. Rowntree[1], Kim A. Cassida[1], Joseph Paling[1], and Douglas Carmichael[2], *[1]Michigan State University, East Lansing, MI, [2]Michigan State University AgBio Lake City Research Center, Lake City, MI.*

The research objective was to compare high-energy forage options during the finishing period for Upper Midwestern forage-finished beef production systems. Twelve 0.80-ha pastures were randomly assigned to 1 of 3 forage treatments including: mixed pasture (MIX); simple cereal grain/brassica mixture (SIMP); and complex cereal grain/brassica mixture (COMP). Red Angus-influenced steers (BW = 439 kg ± 15.6, n = 24) were stratified by BW and randomly assigned to 1 of 12 paddocks and were grazed for a 64 d finishing period. Steers had *ad libitum* access to water and free choice mineral, and were given access to strips in each grazing treatment. Fasted BW was measured on d 0, 34, and 64. At the end of the finishing period, steers were slaughtered under Federal Inspection and carcass data were collected 48 h post-mortem. Data were analyzed using Proc Mixed (SAS v 9.4) where paddock was the experimental unit. There was a treatment by period interaction for d 64 BW ($P < 0.01$) where steers on MIX and COMP had greater BW (517 kg ± 8.1 and 514 kg ± 8.1, respectively) than SIMP (490 kg ± 8.1). Steers in MIX and COMP had similar d 0 to 64 BW gains (78 ± 4.3 kg, and 74 ± 4.3 kg), however steers in COMP had greater ($P < 0.01$) d 34 to 64 BW gains than MIX and SIMP (48 ± 1.6 kg versus 34 ± 1.6 kg and 31 ± 1.6 kg, respectively). Although d 64 BW were similar for COMP and MIX, there was a decided advantage ($P < 0.01$) for steers in COMP for HCW and dressing percent (295 kg ± 5.6 and 57.29% ± 0.55). Although there were no differences for LM area, marbling score or USDA yield grade, carcasses from steers in COMP had numerically greater means (69.7 ± 2.8 cm^2, 483 ± 16.9, and 2.5 ± 0.2, respectively) for each carcass trait when compared with MIX and SIMP. These data indicate that steers grazing MIX and COMP had reasonable gains and carcass merit and these systems can be a viable component of forage-finishing systems in the Upper Midwest.

Key Words: beef, forage-finished, grass-finished

62 Using weekly pasture growth and utilization measurements to make management decisions on Oregon dairies. Troy W. Downing*, *Oregon State University, Corvallis, OR.*

The use of weekly pasture cover measurements have been shown useful in New Zealand dairies to estimate daily growth rates, determine grazing rotation, calculate feed inventories and they have been used for feed budgeting. The objectives of this study were to take weekly pasture growth measurements to estimate growth and utilization and to learn how to use this information to make management decisions on Oregon dairies. Additionally, all conserved feed fed was recorded daily and milk solids shipped were recorded and these data were used to estimate the percentage of milk produced from pasture. This study was done on one dairy for a 3-year period. Pastures were measured and mapped and total standing DM was estimated weekly in 22 pastures using a calibrated rising plate meter. Paddocks grazed and residual pasture covers were recorded daily and forage cover measurements were entered into management software. Paddock grazing and residual heights were also included in the electronic recordkeeping. Measurements started in March and continued until the end of November for all 3 years. Weekly grazing wedges were developed and were used to make grazing decisions that week. Estimated dry matter yields for all paddocks each year averaged 18695 ± 3451, 17848 ± 3966 and 17306 ± 5058 kg/ha for each consecutive year. Daily pasture DM growth averaged 47, 49 and 56 kg/ha per day for each of the growing seasons. During year 1 the dairy averaged 1219 kg of milk solids per hectare from grass, 888 kg milk solids for year 2 and 962 kg of milk solids per hectare in year 3. Pasture accounted for 85, 72, and 80% of the total DM consumed on the dairy during the 9 mo grazing season for year 1, 2, and 3, respectively.

Key Words: rotational grazing, rising plate meter, pasture management

63 Evaluation of sound-based detection of rumination in grazing dairy cows. Santiago A. Utsumi*[1], Julio R. Galli[2], Diego Milone[3,4], Hugo L. Rufiner[3,4], and Leonardo Giovanini[3,4], *[1]Michigan State University, East Lansing, MI, [2]Universidad Nacional de Rosario, Santa Fe, Argentina, [3]Universidad Nacional del Litoral, Entre Rios, Argentina, [4]CONICET, Argentina.*

Individualized monitoring of rumination time (RT) could be used to guide nutritional recommendations for improved production, health and well-being of dairy cows. One commercial application is the QWES-HR Tag system (HR Tags), which uses a microphone and microprocessor in neck collars for sound-based detection of RT; filtered sounds in 12 × 2 h intervals are automatically integrated for estimation of 24 h moving RT, but inaccurate detection or processing of sounds could significantly affect estimations. A study was conducted to compare the automatic detection of RT by HR Tags against observed values obtained by supervised inspection of 24-h soundtracks. The RT of 5 lactating Holstein cows on ryegrass/white clover or orchardgrass/white clover pastures was monitored for 6 non-consecutive days, using 2 sound-based methods (1) HR Tags and, (2) Acoustic Halters, which included a digital recorder and one directional microphone pressed to the animal's forehead (Control). Five halters were used with halters rotated across cows according to a completely randomized design. Cross-validation of HR Tags (24-h and 2-h periods) was conducted by inspection of the root of the mean squared prediction error (RMSPE) and concordance correlation coefficient (CCC) between methods. The HR Tags consistently underestimated RT by 18%, regardless of the period of measurement (Table 1). Similarly, high RMSPE and low CCC indicated limited accuracy and low precision by HR Tags, which were slightly improved for 24 h evaluations (Table 1). Further research is needed to improve the automatic sound-based detection of rumination by commercial HR Tags.

Table 1 (Abstr. 63). Estimation of 24-h and 2-h rumination time by 2 acoustic methods

Rumination time/ measurement period		Control	HR Tags
24 hour (n = 29)	Mean (min)	534	437
	SE (min)	19.2	25.4
	RMSPE (min)		90.7
	CCC (%)		36.6
2 hour (n = 349)	Mean (min)	44.3	36.3
	SE (min)	1.7	1.2
	RMSPE (min)		30.6
	CCC (%)		23.8

Key Words: acoustics, grazing behavior, rumination

64 Evaluation of forage quality of five grains for use in sprouted fodder production systems for organic dairy cattle. Bradley J. Heins*[1], James C. Paulson[2], and Hugh Chester-Jones[3], *[1]University of Minnesota, West Central Research and Outreach Center, Morris, MN, [2]University of Minnesota Extension, Rochester, MN, [3]University of Minnesota, Southern Research and Outreach Center, Waseca, MN.*

The objective of the study was to evaluate 5 grains for use in sprouted fodder productions systems at the University of Minnesota's West Central Research and Outreach Center, Morris, MN. Forage mass, mold score, dry matter, and forage quality were evaluated for varieties of sprouted organic barley, oats, wheat, rye, and triticale harvested at 7 d after the start of sprouting. During September 2014, on every Monday for 6 weeks, 28 fodder trays (0.6 m x 1.8 m) from a FarmTek Fodder Pro system were filled with 4.1 kg of pre-soaked grain, which was soaked for 24 h. Each tray was automatically watered 3 times a day for 4 min each time. On the seventh day, each tray was harvested, weighed, and visually scored on a 1 to 5 scale for mold by one observer. Ten random samples from each sprouted grain each week were saved for dry matter and forage quality analysis. Sprouted forage samples were sent to Rock River Laboratory, Inc., Watertown, Wisconsin, and were analyzed by wet chemistry for DM, CP, NDF, and TDN. Data were analyzed using the MIXED procedure of SAS. Independent variables for analyses were the fixed effects sprouted grain, and date of harvest and replicate were random effects. Sprouted barley (9.3 kg), oats (9.0 kg), and wheat (8.8 kg) had greater ($P < 0.05$) forage mass per tray than sprouted rye (7.8 kg) and triticale (6.3 kg). Mold scores were lower ($P < 0.05$) for sprouted barley (0.04) and oats (0.03) compared with sprouted rye (2.8) and triticale (4.8). Sprouted barley DM (15.4%) was lower ($P < 0.05$) than sprouted oat (19.1%), rye (19.8%), triticale (24.2%), and wheat (18.9%) DM. Concentrations of CP averaged 15.6%, 13.1%, 12.8%, 17.0%, and 17.9% for sprouted barley, oats, rye, triticale, and wheat, respectively, and they were different ($P < 0.05$) from each other. The NDF was greater ($P < 0.05$) for sprouted barley and oats (34.4% and 44.8%, respectively) compared with sprouted rye, triticale, and wheat (23.6%, 20.4%, and 26.7%, respectively). Sprouted triticale (79.7%) had higher TDN than sprouted oats (71.8%), which was the lowest for TDN. In summary, the results show that sprouted barley has the highest forage quality for fodder production systems.

Key Words: sprouted fodder, NDF, forage quality

65 Protein quality of grass silage as affected by silage additives and its effects on dairy cow performance. Elisabet Nadeau*[1], Björn Johansson[2], Wolfram Richardt[3], and Michael Murphy[2], *[1]Swedish University of Agricultural Sciences, Skara, Sweden, [2]Lantmännen Feed Division, Malmö, Sweden, [3]LKS mbH, Lichtenwalde, Germany.*

This experiment was conducted to evaluate the effects of improved protein quality of grass silage by additive use on dairy cow intake and performance. Grass from the first regrowth was wilted to 33% DM before being precision chopped and treated with the inoculant Kofasil Duo (*Lactobacillus plantarum/Lactobacillus buchneri*, 200,000 cfu/g) or with the chemical additive Kofasil Ultra K (sodium nitrite, hexamine, potassium sorbate, sodium benzoate and sodium propionate, 2 L/T, Addcon Europe GmbH), which were compared with a control without additive. The forage was ensiled in hard-pressed round bales before being fed to 48 dairy cows (150 DIM) in a continuous trial for 9 wk using 8 cows per treatment. Cows were blocked according to breed, parity, DIM and milk yield. The silage contained 15% CP, 47% NDF, 3.3% WSC, 8.2% lactic acid, 2.1% acetic acid and 0.25% NH3-N of DM with minor differences between treatments. Rumen undegradable protein (RUP) of the silage at 5% passage rate was 22, 23 and 24% of CP for control (C), inoculant (I) and salt-based (S) additive, respectively. Diets were isonitrogenous (15.1% of DM) and isoenergetic (11.4 MJ/kg DM) varying in RUP (4.7% (high) and 2.5% (low) of DM). Concentrate UDP was 2.9 and 8.6% of DM. Dietary forage proportion of the TMR was 58% of DM. Data were analyzed using PROC MIXED of SAS with RUP, silage and week as fixed factors and block as a random factor. High RUP diet had higher milk yield than low RUP diet (29.4 vs. 27.9 kg; $P < 0.05$). The DM intake was not affected by RUP and silage treatment. Yields of milk and ECM were higher for the I and S diets than for the C diet at low RUP (28.9 vs. 26.0 kg milk, $P < 0.01$; 30.6 vs. 27.1 kg ECM, $P < 0.001$) whereas there was no effect of additive treatment in the high RUP diet. Milk fat and protein did not differ between silage treatments. Feed efficiency was higher for the I and S diets than for the C diet at the low RUP (1.6 vs. 1.3 kg of ECM/kg DM intake, $P < 0.001$) but not at the high RUP. The increased milk yield and feed efficiency when fed a diet with low RUP can partly be explained by increased RUP of the I and S silages.

Key Words: additive, protein quality, silage

66 Effects of type and level of energy supplementation on stocker cattle performance from annual ryegrass. Carla J. Weissend*, Courteney M. Holland, Kaleb B. Marchant, Samantha R. Sechler, and Russell B. Muntifering, *Auburn University, Auburn, AL.*

Supplementation of high-quality grazed forage with high-energy feedstuffs can improve animal performance and enable increased stocking rates. However, the extent of performance improvement and direction of forage utilization response may be dependent upon supplementation level and whether the supplement is a high-starch or highly-digestible-fiber feedstuff. For these reasons, a grazing experiment was conducted to determine the type and level of supplementation with select high-energy feedstuffs that yield optimum animal performance and forage utilization from annual ryegrass (*Lolium multiflorum*). Twenty 0.81-ha pastures were each grazed by 4 crossbred steers (235 kg ± 15 kg initial BW) between Feb. 6 and May 15, 2014. Cracked corn (CC), pelleted citrus pulp (CP) or pelleted soybean hulls (SH) were fed at rates of 0.25, 0.50 and 0.75% of steer BW daily (2 rate × supplement replicates per treatment, including replicate pastures in which steers received no supplement). Steers were weighed every 28 d following an overnight shrink. Forage mass was measured every 28 d using the destructive harvest/disk meter dual-sampling method. Data were analyzed as a completely randomized design by the PROC GLM procedure of SAS 9.2 using pasture as the experimental unit. There were no supplement type × level interactions ($P > 0.05$) observed for either ADG or net forage mass change (FMC). Steers receiving CC and SH supplementation had greater ($P < 0.05$) ADG (1.30 and 1.23 kg/d, respectively), and steers receiving CP tended ($P = 0.07$) to have greater ADG (1.20 kg/d) than steers receiving no supplement (0.95 kg/d). Steers supplemented at 0.25 and 0.75% BW had greater ($P < 0.05$) ADG (1.23 and 1.30 kg, respectively) than steers receiving no supplement (0.95 kg/d). Net FMC over the entire grazing season increased ($P < 0.05$) in pastures grazed by steers receiving CC (+38 kg DM/ha) compared with those grazed by steers receiving SH (−277 kg/ha). There were no differences in net FMC between any of the supplementation types or levels and the unsupplemented control. Patterns of net FMC response indicate relative underutilization of forage by steers receiving CC (i.e., substitution effect of supplementation) compared with steers receiving SH or CP.

Key Words: beef cattle, ryegrass, supplementation

67 Performance of *Bos indicus* versus *Bos taurus* stocker cattle grazing 'Coastal' bermudagrass supplemented with distillers dried grains. W. Brandon Smith*[1], F. M. "Monte" Rouquette[1], Joel L. Kerby[1], Luis O. Tedeschi[2], Jamie L. Foster[3], Jason P. Banta[4], Kimberly C. McCuistion[5], and Tanner J. Machado[5], *[1]Texas A&M AgriLife Research, Overton, TX, [2]Texas A&M University, College Station, TX, [3]Texas A&M AgriLife Research, Beeville, TX, [4]Texas A&M AgriLife Extension, Overton, TX, [5]Texas A&M University-Kingsville, Kingsville, TX.*

The objective of this study was to evaluate performance of "long yearling" stocker steers grazing 'Coastal' bermudagrass (*Cynodon dactylon* [L.] Pers.) and supplemented daily with titrated levels of DDG. Steers (n = 63 [7 testers per pasture; 4 Brahman, 3 other], 352 ± 7.6 kg initial BW, approx. Fifteen mo of age) were stratified by BW within source (Overton or McGregor) and known sire breed type (Angus or Charolais, both with Brahman crossbred dams; or purebred Brahman) and allocated randomly to 1 of 9 paddocks (1.3 ± 0.17 ha), and paddocks were allocated randomly to 1 of 3 levels of DDG supplementation for the 96-d study: 0.00, 0.25 or 1.00% BW hd^{-1} d^{-1}. Animals were group-fed daily at 0800 h, and bunk space was allowed at a minimum of 61 cm hd^{-1}. Forage mass was assessed by destructive harvest of four 0.09-m^2 quadrats throughout each pasture on 21-d intervals. Steers were weighed every 21 d, and grazers were added to each pasture based on visual and numerical assessments to maintain vegetative growth while preserving ad libitum intake and selection. Data were analyzed using SAS PROC MIXED. Average daily gain was greater ($P < 0.05$) from steers offered 1.00% BW daily (0.97 kg d^{-1}) compared with those offered 0.00 or 0.25% BW daily (0.71 and 0.69 kg d^{-1}, respectively), and *Bos indicus* steers gained more (0.93 kg d^{-1}; $P < 0.05$) than *B. taurus* steers (0.72 kg d^{-1}). Supplement to gain ratio was not different among treatments ($P = 0.29$) or species ($P = 0.76$). Pastures in which supplement was offered at 1.00% BW tended to sustain more ($P = 0.06$) AU (363-kg steer) per ha (8.8 AU ha^{-1}) compared with 0.00% pastures (6.3 AU ha^{-1}), with 0.25% pastures intermediate (8.2 AU ha^{-1}). Additionally, pastures supplemented at 1.00% BW supported more ($P < 0.05$) gain per unit area (851 kg ha^{-1}) than pastures supplemented at 0.00 or 0.25% (431 and 575 kg ha^{-1}, respectively). Thus, supplementation of stocker calves with DDG at the 1% level, especially *B. indicus*, may be a viable option for increased performance from stocker cattle, as well as increased stocking density, on bermudagrass pastures, depending on the economic factors of the current market.

Key Words: Coastal bermudagrass, DDG, stocker

68 Interaction between a tannin-containing legume and endophyte-infected tall fescue seed on lamb feeding behavior and physiology. Juan J. Villalba*[1], Casey Spackman[1], Ben Goff[2], James L. Klotz[3], and Jennifer W. MacAdam[1], *[1]Utah State University, Logan, UT, [2]University of Kentucky, Lexington, KY, [3]USDA-ARS, Lexington, KY.*

It was hypothesized that a tannin-rich legume like sainfoin reduces the negative postingestive effects of ergot alkaloids in tall fescue. Thirty-two 3-mo-old lambs were individually penned and randomly assigned to a 2 × 2 factorial experimental design with 2 legume species (sainfoin [SF; tannins] or cicer milkvetch [CIC; no tannins]) and a ration (seed:beet pulp:alfalfa, 50:30:20) containing 2 types of tall fescue seed (endophyte-infected [E+;1,745 ppb ergovaline] or endophyte-free [E–]). For a 10-d baseline period, all groups were fed their respective supplemental legumes (17 to 25 g DM/kg BW) and ad libitum amounts of E–. In an ensuing 10-d testing period, the protocol was the same but half of the lambs received E+ instead of E-. Daily feed intake and rectal temperatures were measured for both periods and jugular blood was extracted at the beginning and end of the testing period. Subsequently, all lambs had choices between their respective legume (SF; CIC) and seed-containing rations (E+; E–). Response variables were analyzed using a mixed effects model, which included legume, ration and day as fixed effects and lamb as a random factor. All groups consumed similar amounts of E– during baseline ($P > 0.10$). However, lambs ate more E– than E+ during testing ($P < 0.05$) and lambs offered SF ate more E+ than lambs offered CIC ($P < 0.05$). Groups fed E– during baseline and testing periods had similar rectal temperatures ($P > 0.10$). However, lambs fed E+ had lower rectal temperatures when supplemented with SF than with CIC ($P < 0.05$). Lambs fed E+ had a greater concentration of hemoglobin and number of red blood cells than lambs fed E– ($P < 0.05$). Plasmatic concentrations of cortisol and prolactin did not differ between treatments ($P > 0.10$). All lambs preferred their respective rations over their respective legumes and they preferred E– over E+ ($P < 0.05$). In summary, SF increased intake of E+ and reduced rectal temperatures relative to CIC supplementation. However, SF did not lead to changes in preference for E+ or improvements in other physiological parameters assessed.

Key Words: ergot alkaloids, ingestive behavior, prolactin

69 Effect of a combination of lactic acid producing bacteria and fibrolytic enzymes on the ensiling characteristics of cool season grasses: A farm-scale application. Jeffrey M. Chilson*, Chia-Yu Tsai, Kirk C. Ramsey, Richard Scuderi, and Pedram Rezamand, *University of Idaho, Moscow, ID.*

In prior research, using a combination inoculant containing homofermentative lactic acid bacteria and fibrolytic enzymes we showed an improvement in rumen DM degradation, lactic acid production and rate of pH decline, for alfalfa using small scale setting. The objective of the present study was to test the effectiveness of the inoculant on the quality of ensiled mixed cool season grasses (orchard, oat, mountain brome and Italian rye grasses) in a farm scale setting. Grasses were harvested and the windrows randomly assigned to either the control (Con) or inoculant (Trt). The Con was treated with water only and Trt was treated with an equal amount of water plus the inoculant. Control was baled, and wrapped first, followed by Trt. On d 86, 88, 90, 92, 94, 3 bales from each group were removed, weighed, core samples taken and composite samples prepared for analysis. Composite samples were analyzed for pH, lactic acid, DM, and NDF. Statistical analysis was conducted using a T-Test, on SAS v. 9.4. Initial DM did differ between Con and Trt ($P = 0.03$; 52.3 vs. 58.4 ± 1.9%) possibly related to temperature change (start 16°C, finish 32°C) during baling. Initial pH was not different between Con and Trt. Initial NDF was not different between groups ($P = 0.15$; 60.02 vs. 58.29 ± 0.72%). Final pH was not different between Con and Trt, either ($P = 0.45$; 5.24 vs. 5.36 ± 0.12). DM loss was numerically greater for Con, but not significant, either on kg/bale basis ($P = 0.39$; 91.7 v. 85.9 ± 12.5kg) or as a percent/bale basis ($P = 0.32$; 24.9 vs. 20.9 ± 3.0%). Lactic acid production was not different between groups ($P = 0.14$; 40.89 vs. 75.24 ± 19.88 μmol/g DM). There was, however, a significant difference in final NDF between Con and Trt ($P = 0.04$, 55.25 vs. 57.84 ± 0.81%). Whereas Trt showed greater NDF, Con had numerically greater DM loss, possibly indicating that Con lost more soluble nutrients during ensiling. Furthermore, final pH for both Con and Trt were above desired pH of 4.00–4.20, which could indicate that fermentation was in part inhibited by the high initial DM.

Key Words: inoculant, silage, grass