Virginia Tech Shenandoah Valley Agricultural Research and Extension Center

2003 Field Day Proceedings

July 31, 2003

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Field Day Program
Shenandoah Valley Agricultural Research and Extension Center

July 31, 2003

2:30 – 3:00	**Registration** – ($5.00 per person)
3:00 – 3:10	**Welcome** – *David Fiske, Superintendent, Shenandoah Valley AREC*
3:10 – 3:15	Walk to Finishing Barn
3:15 – 3:30	**Pasture-based Beef Systems for Appalachia – A Coordinated Approach to meet Regional Needs - –** *Dr. Joe Fontenot, John W. Hancock Jr. Professor, Virginia Tech, W.A. Clapham, and W.E. Bryan*
3:30 – 3:50	**Performance and Carcass Quality of Cattle Finished on Pasture and Feedlot** – *Dr. Jim Neel, USDA ARS and Dr. Joe Fontenot, John W. Hancock Jr. Professor, Virginia Tech*
3:50 – 4:10	**Optimum Nutrition for Development of Breeding Heifers** – *Dr. John Hall, Extension Animal Scientist, Virginia Tech*
4:10 – 4:20	Board wagons and travel to Nutrient Management area
4:20 – 4:35	**Nutrient Management of Broiler Litter for Cattle on Pasture** - *Dr. Joe Fontenot, John W. Hancock Jr. Professor, Virginia Tech and Dr. Greg Mullins, Crop and Soil Environmental Science, Virginia Tech*
4:35 – 4:50	**Phosphorus and Fecal Coliforms in Surface Runoff from Grazed Pastures as Affected by Nutrient Management** - *Dr. Greg Mullins, Crop and Soil Environmental Science, Virginia Tech*
4:50 – 5:10	**Backgrounding Systems for Weaned Calves** – *Dr. Terry Swecker, VA-MD Regional College of Veterinary Medicine, Virginia Tech*
5:10 – 5:15	Board wagons and travel to Ram Barn
5:15 – 5:35	**Virginia Ram Lamb Evaluation Program** – *Dr. Scott Greiner, Extension Animal Scientist, Virginia Tech*
5:35 – 5:45	Board wagons and travel to Big Meadow bottom
5:45 – 6:05	**Clover and Alfalfa Variety Evaluation in Virginia Pastures** – *Dr. Ray Smith, Extension Forage Specialist, Virginia Tech*
6:05 – 6:15	Board wagons and travel to K2A
6:15 – 6:30	**Performance of Cows and Calves on Different Forage Systems** – *David Fiske, Shenandoah Valley AREC*
6:30 – 6:35	Board wagons and travel to Memorial area for dinner
6:35 – 8:00	Thank and recognize sponsors Introductions and comments by special guests Dinner

PASTURE-BASED BEEF SYSTEMS FOR APPALACHIA – A COORDINATED APPROACH TO MEET REGIONAL NEEDS

J.P. Fontenot, W.A. Clapham[a] and W.B. Bryan[b]

The project at the Shenandoah Valley Research and Extension Center is part of a larger initiative, cooperative with USDA-ARS, Beaver, WV and West Virginia University (WVU).

Hill land, characteristic of much of Appalachia, is ideally suited for grassland based beef production. In West Virginia and Virginia some 4.3 million acres are in pasture. Most farmers raise some beef cattle, primarily in relatively small cow-calf operations. Off-farm sales in 1996 of beef cattle and calves in WV and VA amounted to $260 million. However, beef systems in Appalachia deserve a much broader consideration than purely production economics. Secondary benefits in the form of income, employment, and support of agribusiness can be sizable. For many farmers raising beef cattle is a way of life. In addition, keeping hill land open and productive has large benefits to both rural and urban society. These include aesthetic attributes as well as wildlife habitat, which represent real but hard to measure contributions of grassland agriculture to the surrounding community and to society. Yet these benefits can only accrue if the economic stability of the small farm in Appalachia is insured.

The overall goal of the Appalachia Pasture-Based Beef Project Production Systems Regional Project is: development of innovative concepts/practices to enhance the efficiency, profitability and sustainability of grassland-based beef production systems in the Appalachian Region that are economically viable, and environmentally sound. Major components include cow-calf, backgrounding, heifer development, stocker and finishing systems; product quality; and marketing strategies. The different phases of the initiative are shown in Figure 1.

Research by WVU is conducted at Morgantown and Willow Bend, WV. The ARS research includes work at Beaver, Morgantown, and Willow Bend, WV. Most of the VA Tech research is conducted at the Shenandoah Valley Agricultural Research and Extension Center and some at Blacksburg.

The planned timetable for the different components is shown in Figure 2. The project is in the third year. The cycle is complete for the first year, including all phases of production, and evaluation of the meat. Results of the different phases will be presented by other speakers. The project has progressed smoothly, although there have been problems with forage establishment and droughts.

[a] USDA/ARS, Beaver, WV
[b] West VA Univ., Morgantown

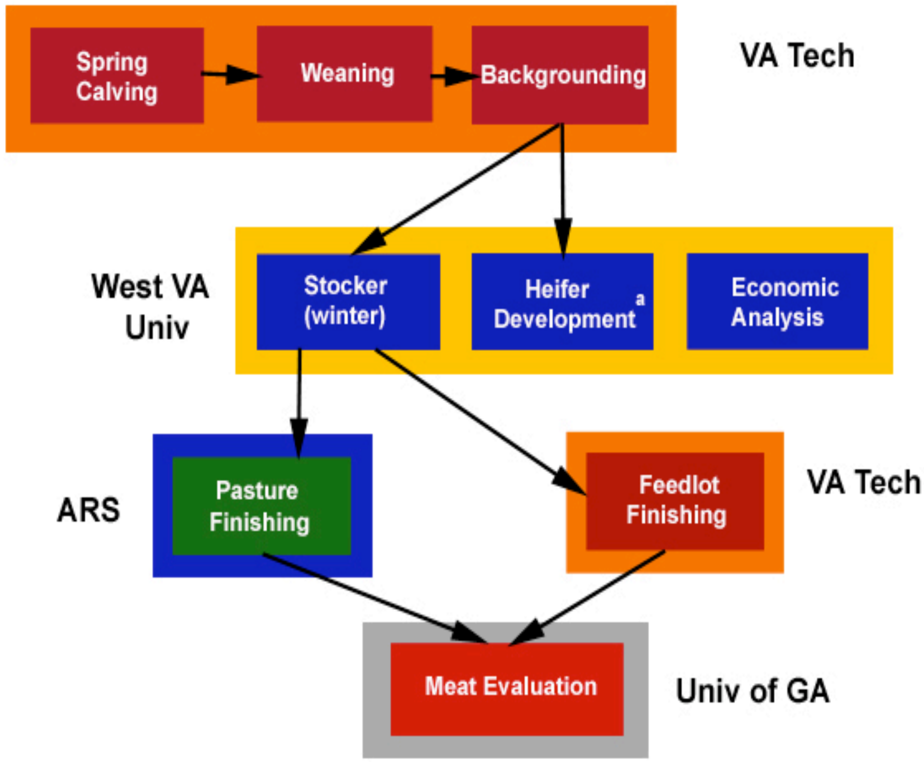
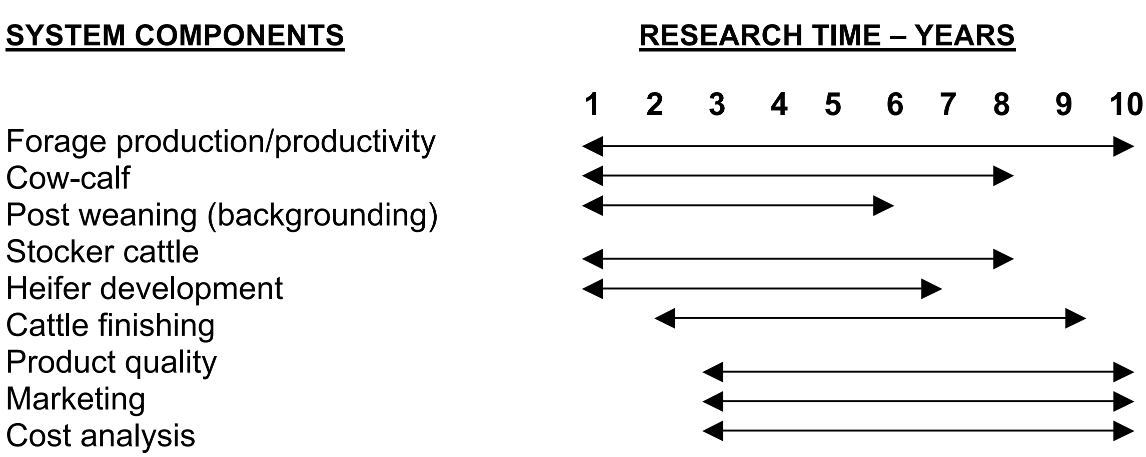


Figure 1. Pasture-based production systems and division of responsibilities

a. Heifer development research is being conducted by VA Tech, also.

FIGURE 2. FORAGE-BASED BEEF SYSTEMS FOR APPALACHIA



Performance and Carcass Quality of Cattle Finished on Pasture and Feedlot

J. P. S. Neel, J.P. Fontenot and William Clapham

Introduction

Demand for lean, high quality meat products has increased in recent years. Health conscious consumers include lean beef products in their diets, and grass-fed beef is imported to the United States to satisfy some of this demand. This meat is perceived as being more healthful (lean) and environmentally friendly from a production standpoint (low input production systems). One of the main problems in the beef industry today is the ability to produce a consistent product. Performance during the stocker period may influence meat quality. A multi-year, multi-location experiment is under way to evaluate the effect of winterfeeding regimes on subsequent pasture and feedlot performance, meat quality characteristics and consumer acceptance. Collaborators on this project are USDA-ARS, West Virginia University, Virginia Tech and the University of Georgia.

Materials and Methods

In early December of 2001, seventy two English-type crossbred steer calves were used to compare growth rate, final weight and carcass parameters from cattle finished on forage (FOR) or high concentrate (CON), after being wintered at low (LOW, ADG = 0.8 lb), medium (MED, ADG = 1.2) or high (HIGH, ADG = 1.8) growth rates. Steers were harvested on the same dates, across treatments, at a commercial meat plant.

Summary

Winter period growth rate influenced finishing period rate of gain, final live and carcass weights, and quality grade. Animals finished on forage had lighter final live and carcass weights. Forage finished beef had less rib fat, smaller ribeye area, lower yield grade and a quality grade of Select.

Tables

Table 1. Diet compositions during winter feeding period by treatment [a]

	Winter gain treatment (ADG)		
Item[a]	Low	Medium	High
	--------%	--------	--------
Timothy hay	94.30	80.95	61.70
Soybean meal	4.85	3.80	3.10
Soybean hulls	0.00	14.50	34.50
6:1 mineral	0.85	0.75	0.70

[a]All values are given on an as fed basis.

Table 2. Steer performance and ultrasound back fat and rib eye area measurements during winter-feeding period

	Winter gain treatment (ADG)		
Item	Low	Medium	High
Initial wt, lb	577	589	570
Final wt, lb	678 [c]	751 [b]	809 [a]
ADG, lb	0.77 [c]	1.23 [b]	1.81 [a]
Initial back fat, in	0.11	0.11	0.08
Final back fat, in	0.08 [b]	0.11 [a]	0.13 [a]
Initial REA[d], sq in	6.89	7.10	6.66
End REA, sq in	7.21 [b]	8.50 [a]	8.87 [a]

[abc]Row means followed by unlike letters are significantly different P<0.05; [d]Ribeye area

Table 3. Steer performance and carcass data of finished cattle as influenced by winter gain treatment

	WINTER GAIN TREATMENT (ADG)		
Item	Low	Medium	High
Initial wt, lb	678 [c]	751 [b]	809 [a]
Final wt, lb	1101 [b]	1162 [a]	1193 [a]
ADG, lb	2.74 [a]	2.64 [a]	2.45 [b]
Carcass wt, lb	616 [c]	651 [b]	680 [a]
Dressing %	57.4	57.7	58.5
Rib fat, in	0.37	0.34	0.37
REA[d], sq in	10.9	11.4	11.2
KPH[e], %	1.5	1.5	1.6
Yield grade	2.1	2.0	2.2
Quality grade[f]	3.2 [b]	3.5 [ab]	3.9 [a]

[abc]Row means followed by unlike letters are significantly different P<0.10; [d]Ribeye area; [e]Kidney-pelvic-heart fat; [f]Quality grade: 2 = Select -, 3 = Select +, 4 = Choice –

Table 4. Steer performance and carcass data of finished cattle as influenced by finishing treatment

	FINISHING TREATMENT	
Item	FOR	CON
Initial wt, lb	746	757
Final wt, lb	1088 [b]	1216 [a]
ADG, lb	2.28 [a]	2.94 [b]
Carcass wt, lb	569 [b]	729 [a]
Dressing %	54.3 [b]	61.4 [a]
Rib fat, in	0.23 [b]	0.49 [a]
REA[c], sq in	10.3 [b]	12.0 [a]
KPH[d], %	1.2 [b]	1.9 [a]
Yield grade	1.7 [b]	2.5 [a]
Quality grade[e]	2.5 [b]	4.5 [a]

[ab]Row means followed by unlike letters are significantly different P<0.01; [c]Ribeye area; [d]Kidney-pelvic-heart fat; [e]Quality grade: 2 = Select -, 3 = Select +, 4 = Choice –

Optimum Nutrition for Development of Breeding Heifers

Dr. John Hall,
Extension Animal Scientist, Virginia Tech

Importance of Proper Replacement Heifer Management

Raising replacement heifers has a significant financial impact on the ranching enterprise. The cost of raising replacement heifers until they calve as two-year olds has been estimated at $700 - $1000. This cost must be charged against the 3 to 7 calves that she will produce in her lifetime. The cost of any heifers that do not conceive must be charged against their salvage value and the value of calves produced by the remainder of the herd.

It is not only important to have heifers conceive during their first breeding season, but they need to calve early in the calving season. In order to conceive early in the breeding season heifers must reach puberty (first heat) 30-45 days before the breeding season begins. Research has demonstrated that heifers that calve early in their first calving season continue to do so all their lives. In addition, heifers that calve early their first season will produce 150 more pounds for calf during their lifetime. In today's market, that means approximately $90-$135 more per heifer.

Influence of Nutrition

Nutrition is the management tool that can have the greatest impact on the age at which heifers reach puberty. Heifers of a similar breed composition can reach puberty several months apart when fed different diets. In addition, feed cost accounts for 60-70% of the costs of raising replacement heifers. Therefore, the financial impact of puberty onset is dictated by the age at puberty, and the feed costs associated with achieving a younger age at puberty. In other words, the cost of feeding heifers to reach puberty early should be weighed against the income gained by increased conception rates and heavier weaning weights.

Energy is the primary limiting factor in most replacement heifer diets. In Virginia most forages supply adequate to near adequate levels of protein for developing heifers, but energy levels are inadequate to support proper development. Heifer diets should contain 68 to 70 % TDN to achieve acceptable heifer gains of 1.5 to 2.0 lb. per day.

The goal is to have heifers reach 60-65% of their mature weight 30 to 45 days before the breeding season. This is known as the **Target Weight** concept. Target weight for exotic heifers is usually 65-70% of mature weight. By using a target weight, producers can calculate the rate of gain heifers need to achieve to reach their target weight before the breeding season. Then diets can be formulated based on the desired gains, and heifers monitored by periodic weighing.

Current Research on Heifer Nutrition at SVAREC

Over the past 4 years, nutritional research with replacement heifers has focused on the source of energy in heifer diets. Increasing levels of fat in the diet of replacement heifers may decrease age at puberty or conception rates. Also, supplements that are high in starch can interfere with the ability of the rumen microorganisms to digest fiber. Since grazing or stored forages are the principal source of nutrients in replacement heifer diets then it is important that supplements fed to heifers to ensure proper growth rates do not reduce heifer performance on forage based diets.

Experiment 1

Objective: to determine if a high fat diet would reduce age at puberty and/or improve conception rates in replacement heifers.

Methods: During the two years of the study, eighty-eight heifers were randomly assigned to either a high fat (5% crude fat) or normal (2% crude fat) diets. Silage-based diets met requirements for growing heifers (NRC, 1996), and were designed to produce gains of 1.75 lb./head/day. Diets were isonitrogenous and isoenergitic and contained 71% TDN and 13.7% crude protein. Supplemental fat in the high fat diet was supplied by whole cottonseed. Heifers were fed in four replicates per treatment per year. Heifers were weighed every 14 days.

After 45 days on diets, heifers were synchronized using the 14-19 MGA-Lutalyse system. Heifers were artificially inseminated (AI) approximately 12 hours after estrus as detected by the HeatWatch system. Estrus detection and AI continued for 25 days after synchronization. Feeding of diets was terminated on day 100 of the experiment, and heifers were placed with bulls 14 days after the end of dietary treatment. Bulls remained with heifers for 30 days.

Blood samples for analysis of glucose, BUN and cholesterol were taken on day 0, 42 and 78 of each year. In year 2, heifers were examined by ultrasound for ovarian structures on days 59, 75 and 78. Also in year 2, daily blood samples for progesterone analysis were obtained for 25 days following AI. In both years, pregnancy diagnosis and fetal age was determined by ultrasound.

Results: Dietary treatment did not affect heifer body weights. Final body weights were 380 ± 6.3 kg and 378 ± 6.3 kg for high fat and normal diet heifers, respectively. There was a tendency ($P < 0.1$) for fewer heifers fed the high fat diet to be pregnant by natural service (Figure 1). This was due in part to 14% more of high fat than normal fed heifers were pregnant to AI. These tendencies are intriguing, but studies with greater numbers of heifers are needed to confirm the positive effect of high fat diets on AI pregnancy rates.

Experiment 2

Objective: to determine if the source of energy (starch vs. fat vs. fiber) affect age at puberty and/or improve conception rates in replacement heifers.

Methods: During the two years of the study, seventy-two heifers were randomly assigned to a high fat (5% crude fat), high fiber or high starch containing supplements. Heifers were grazed on stockpiled fescue pastures with hay available when grazing was limited. Hay feeding ceased when spring growth of forage became adequate. Grazing plus supplement was designed to meet requirements for growing heifers (NRC, 1996), and produce gains of 1.75 lb./head/day. Supplements were isonitrogenous and isoenergitic and provided 0.53 kg of crude protein and 2.2 kg of TDN/head/day (Table 1). Heifers were fed in two replicates per treatment per year. Heifers were weighed every 14 days.

Diets were fed for 75 days before and 15 days after artificial insemination. Heifers were synchronized using the 14-19 MGA-Lutalyse system (year 1) or the GnRH-CIDR system. Heifers were artificially inseminated (AI) approximately 12 hours after estrus as detected by 3x daily visual estrus detection. All heifers not detected in estrus by 72 hours after PGF were bred by fixed time AI. Fourteen days after AI, bulls were placed with heifers for a 30 day natural service period. Pregnancy diagnosis and fetal age was determined by ultrasound.

Results: Dietary treatment did not affect (P > 0.3) heifer body weights or average daily gains (Table 2). However, initial and final body weights of heifers were greater in Year 2 than in Year 1, whereas, average daily gain was greater for heifers in Year 1 than Year 2. Pregnancy rate to AI (both years) and overall pregnancy rate (year 1) were not affected by source of calories (P > 0.2; Table 2).

Supplement costs for year 2 per heifer per day are indicated in Table 1. Over the 90 feeding period in 2003, a group of 20 heifers fed the cottonseed supplement would have feed costs reduced by $ 44.10 compared to heifers fed the corn/soy supplement. The combination of pregnancy rates and feed cost results indicate that as long as energy requirements of the developing heifer are met through supplementation then the most economical source of supplementation should be used.

Figure 1: Effect of high fat or normal diets on pregnancy rates in replacement beef heifers

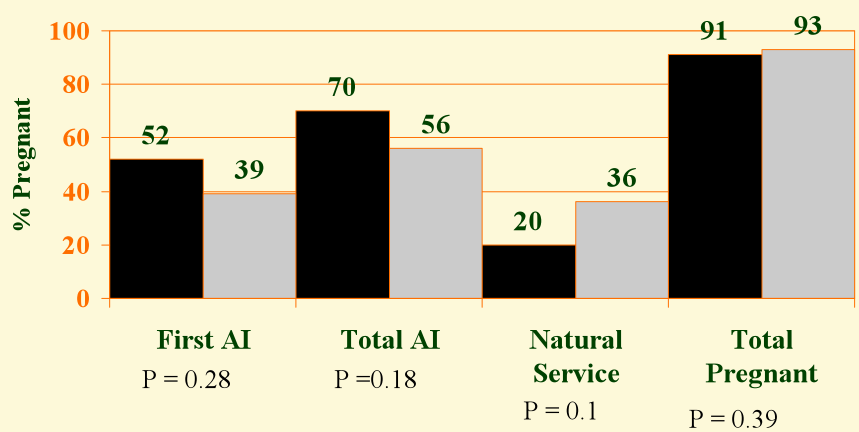


Table 1. Composition of heifer supplements (Dry matter basis)*

Ingredient	Soyhull supplement	Cottenseed supplement	Corn/soybean meal supplement
Soyhulls	82.3 %	0.0 %	0.0 %
Whole cottonseed	0.0 %	45.2 %	0.0 %
Corn	0.0 %	50.6 %	79.8 %
Soybean meal	16.5 %	2.7 %	18.8 %
Urea	1.3%	1.4 %	1.4 %
Lbs of dry matter fed	6.08	5.53	5.59
Cost of supplement/ heifer/ day	$ 0.44	$ 0.43	$ 0.46

* Complete mineral provided free choice.

Table 2. Initial and final body weights and trial average daily gain for heifers fed different types of energy supplements during the late development and artificial insemination periods. [a]

Supplement	**Initial Weight, kg (SE = 7.6 kg)**	**Final Weight, kg (SE = 8.4 kg)**	**Average Daily Gain, kg/d (SE = 0.05 kg/d)**
	Year 1		
Soyhull	307.6	372.9	0.84
Cottonseed	306.4	369.7	0.81
Corn/soybean meal	295.8	364.9	0.89
	Year 2		
Soyhull	330.8	386.0	0.73
Cottonseed	329.2	383.7	0.72
Corn/soybean meal	329.8	383.3	0.72

[a] Means between years for all growth measures were different ($P < 0.03$); No effect of treatment ($P > 0.3$)

Table 3. Pregnancy rate (proportion) of heifers fed different supplements during late development and artificial insemination period. [a]

Supplement	Pregnancy rate to AI	Overall pregnancy rate
Soyhull	45.8 % (11/24)	79.2 % (19/24)
Cottonseed	45.8 % (11/24)	75.0 % (18/24)
Corn/soybean meal	54.1 % (13/24)	83.3 % (20/24)

[a] No effect of treatment ($P > 0.3$)

Optimizing Diets for Heifers

Based on the results from our heifer development studies at Steeles Tavern as well as other reported research, beef producers should concentrate on maintaining sufficient gains for heifers to meet or exceed target weights by the beginning of the breeding season. Supplementing grazing/hay diets or using silage-based diets will result in acceptable gains for developing heifers.

The source of energy in the diet does not appear to be important as long as energy requirements are met. Although a slight advantage to feeding high fat diets on pregnancy rates to AI was noted, further large scale research is needed to verify this benefit. Supplementing heifers on pasture and hay appears to be the most economical choice. Producers should consider price and ease of handling when selecting supplements.

In the present research, supplements were equal in amounts of protein and energy; therefore, supplements were more complicated than needed. Producers should be able to meet nutritional needs of heifers with 6 lbs of soyhulls or 6 lbs of a 90% corn 10% soybean meal mix. Producers are encouraged to consult their Animal Science Extension agent or nutritionist when designing supplements for heifers.

NUTRIENT MANAGEMENT OF BROILER LITTER FOR CATTLE ON PASTURE

J. P. Fontenot, R. K. Shanklin, D. Fiske, G. Mullin, and L. Harlow

INTRODUCTION

Animal wastes have been used traditionally as sources of plant nutrients, but in many instances the low price of inorganic fertilizer has discouraged land application. Virginia researchers have shown that animal wastes can be used successfully as animal feed. A substantial amount of the poultry litter produced in Virginia is used for animal feed. Litter is worth at least $60 more per ton as animal feed than fertilizer. Furthermore, judicious use of litter as feed would prevent excessive land application of the wastes and enhance environmental quality. Since ruminants retain only a small fraction of the nitrogen (N) and mineral elements, feeding the waste to cattle on pasture should result in almost comparable application of plant nutrients as if applied directly to the soil. The objective of the experiment is to determine the relative efficiency of recycling nutrients by feeding or soil application of poultry litter.

PROCEDURE

The experiment consists of stocker cattle grazing tall fescue pastures and fed fescue hay as needed. Endophyte-free KY-31 fescue was established on 35 acres. The pastures are at the Shenandoah Valley Agricultural Research and Extension Center, Steeles Tavern. The treatments are as follows: 1 – No supplementary feeding of broiler litter or soil application of fertilizer or litter; 2 – Feeding broiler litter; 3 – Soil application of broiler litter; 4 – Soil application of inorganic fertilizer. The amount of litter applied to the soil (treatment 3) is the same as the amount fed to cattle of treatment 2 the previous year. The amount of fertilizer applied supplies the same amounts of nitrogen, phosphorus and potassium as the amounts in the litter fed the previous year. The litter is fed during the entire trial to the cattle of treatment 2, mixed with ground corn grain (4 lb/day). The other cattle are fed the same amount of corn as those fed the corn-litter mixture. Average chemical composition and mineral levels of the litter for 7 yr were 84.4% dry matter, 26.2% crude protein, 2.69% calcium, 1.72% phosphorus, and 558 ppm copper (dry matter basis).

There are three pasture replications of each treatment, with four steers per paddock. Fescue on 55% of the area is grazed during the spring and summer. About 45% of the areas are used for making hay and stockpiling. The steers graze stockpiled fescue starting in November or December, and hay is fed during periods of heavy snow accumulation or after the stockpiled forage supply is exhausted. Steers remain on pasture until the following October.

The average amounts of litter, dry matter basis, that have been fed (treatment 2) and applied to the soil (treatment 3) were 2026 lb. The inorganic fertilizer applied to the soil (treatment 4) supplied 91 lb N, 86 lb P_20_5, and 51 lb K_2O /acre. Also, each year 80 lb of nitrogen per acre were applied to all pastures to be stockpiled (45% of total area).

SUMMARY

Stocker cattle have grazed endophyte-free tall fescue and fed fescue hay as needed since 1994. Daily gains have been lower for the control steers (treatment 1, Table 1). Highest gains were for the steers fed broiler litter. Generally, minerals in forages and blood serum minerals have been in normal ranges (Table 2). Serum copper was higher for the cattle fed broiler litter. After 8 yr, soil phosphorus and potassium were highest in pastures in which litter was fed and litter and inorganic fertilizer were applied to the soil (Table 3). Levels of soil copper were higher in pastures on which litter was fed or applied to the soil.

Table 1. Performance of Steers on Fescue Pasture or Fed Fescue Hay. Avg 8 Years

Treatment				
		Broiler litter		
Item	None	Fed	Soil application	Inorganic fertilizer
	---------- lb ----------			
Initial wt	486	486	487	489
Final wt	859	942	913	914
Daily gain	1.33	1.63	1.50	1.44

Table 2. Pasture Forage and Blood Serum Mineral Levels[a]. Avg 8 Years

Treatment				
		Broiler litter		
Item	None	Fed	Soil application	Inorganic fertilizer
Pasture forage				
Nitrogen, %	2.75	2.80	2.82	2.81
Calcium, %	0.50	0.49	0.47	0.48
Phosphorus, %	0.32	0.33	0.33	0.35
Copper, ppm	5.20	5.61	6.51	4.90
Blood serum				
Calcium, mg/dl	10.04	9.80	10.09	10.09
Phosphorus, mg/dl	7.07	7.60	7.14	7.08
Copper, µg/dl	58.18	73.55	62.19	56.43

[a]At end of trial, each year.

Table 3. Soil Mineral Levels for Pastures Grazed by Steers

			Treatment		
			Broiler Litter		
Item	Year	None	Fed	Soil application	Inorganic fertilizer
P_2O_5, lb/A	1996	21	33	35	43
K_2O, lb/A		104	98	118	95
Cu, ppm		0.35	0.32	0.38	0.37
P_2O_5, lb/A	1997	25	54	47	52
K_2O, lb/A		59	88	131	84
Cu, ppm		0.34	0.35	0.47	0.39
P_2O_5, lb/A	1998	30	52	75	97
K_2O, lb/A		105	144	167	121
Cu, ppm		0.30	0.47	0.60	0.29
P_2O_5, lb/A	1999	31	85	88	86
K_2O, lb/A		93	162	180	120
Cu, ppm		0.32	0.75	0.70	0.32
P_2O_5, lb/A	2000	32	78	116	11
K_2O, lb/A		91	205	197	207
Cu, ppm		0.27	0.59	0.62	0.30
P_2O_5, lb/A	2001	24	89	103	88
K_2O, lb/A		86	176	174	130
Cu, ppm		0.32	0.70	0.62	0.28
P_2O_5, lb/A	2002	12	41	70	55
K_2O, lb/A		49	143	126	110
Cu, ppm		0.25	0.58	0.65	0.22

PHOSPHORUS AND FECAL COLIFORMS IN SURFACE RUNOFF FROM GRAZED PASTURES AS AFFECTED BY NUTRIENT MANAGEMENT

G. L. Mullins, J.P. Fontenot, G. A. Alloush, D. G. Boyer and D. P. Belesky

INTRODUCTION

Manure, whether mechanically applied or deposited by grazing animals, has been associated with non-point source pollution. In addition to manures potential effects on nutrient transport in runoff and water quality, applied manure may also impact the concentrations of microorganisms in runoff and streams including *Fecal Coliforms* (FC). The objective of this study was to evaluate the effects of long-term poultry litter and fertilizer management strategies on nutrient losses and fecal bacteria in surface runoff from grazed fescue pastures. We report the potential transport of different forms of P and concentrations of fecal coliform (FC) in surface runoff.

METHODS

A field study was established in 1994 and continued through 2001 that investigated the effect of nutrient management of pastures on cattle production and soil fertility. The test area was located on a Frederick silt loam (clayey, mixed, mesic, Typic Paleudults). Nutrient management treatments included a no fertilizer control (C), soil applied inorganic fertilizer (AIF), soil applied broiler litter (ABL) and broiler litter fed to steers (FBL). The amount of litter applied to the soil (ABL) was the same as the amount fed to cattle of treatment FBL the previous year. The amount of fertilizer applied to treatment AIF supplied the same amounts of nitrogen, phosphorus and potassium as the amounts in the litter fed the previous year. In the present study, we conducted simulated rain trials in 2001 (after the seventh year of running the grazing trial).

Two runoff plots were located in each paddock with the long axis oriented down a chosen slope between 5 and 8%. Within each plot, paired 0.75 x 2-m subplots (one 1.5 x 2-m plot split along the long axis) were used, making a total of four replicates in each paddock. Prior to the simulated rainfall event, the soil was sampled from outside the plot area adjacent to the plot frame (approximately 10 soil cores) from the surface 0-10 cm (4-inch) soil depth.

The simulated rainfall intensity was a constant 65-72 mm h^{-1} (~2.75 in/hour) maintained until a 30-min period of continuous runoff had occurred from each plot. Runoff from simulated rainfall events (<0.45μm) was analyzed for dissolved inorganic P (DPi), molybdate reactive P (MRP), total dissolved P (TDP), particulate P (PP), total P (TP), and fecal coliform (FC) counts. The amounts of P extracted from the soil by various methods were regressed against DPi, MRP, and TDP concentrations in surface runoff

SUMMARY

Concentrations of DPi, MRP, and TDP in surface runoff, while decreasing with time during the 30-minute reunoff events, were higher in AIF, ABL, and FBL than in the C treatment. These concentrations in runoff were higher in AIF and ABL than in FBL, indicating that feeding broiler litter to cattle decreased the potential mobility of P. Particulate P losses were lower than the MRP fraction, constituting 27, 42, and 27 % for AIF, ABL, and FBL, respectively, compared to 50% in the C treatment. Counts of FC were high in all treatments (higher than 7000 CFU 100 mL^{-1}), and being slightly greater in ABL and FBL compared to C and AIF treatments. Relating STP to P released in surface runoff was significant with all STP levels observed in this study.

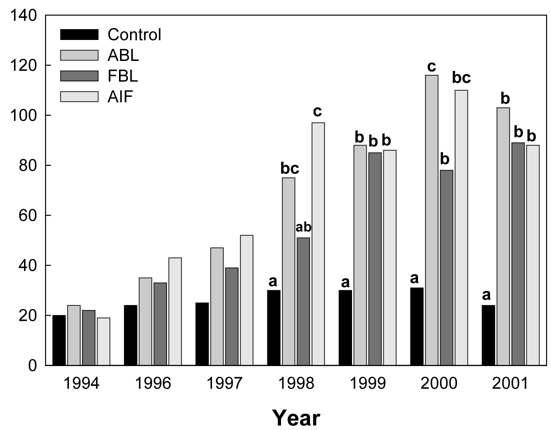


Fig. 1. Mehlich-1 extractrable P in the surface 0-10 cm (4-inch) layer of soil as affected by nutrient management treatments applied to fescue pastures from Dec. 1994 – 2001.

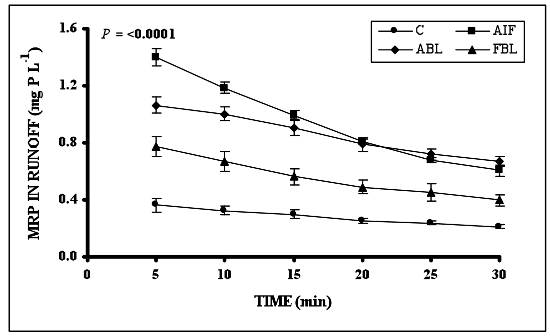


Fig. 2. Concentrations of dissolved inorganic P (DPi), molybdate reactive P (MRP), and total dissolved P (TDP) in surface runoff during 5 min intervals of a 30-min runoff event under simulated rainfall

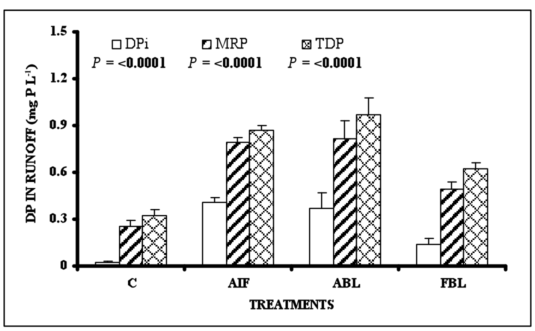


Fig. 3. Average concentrations of dissolved inorganic P (DPi), molybdate reactive P (MRP), and total dissolved P (TDP) in surface runoff during a 30-min runoff event under simulated rainfall.

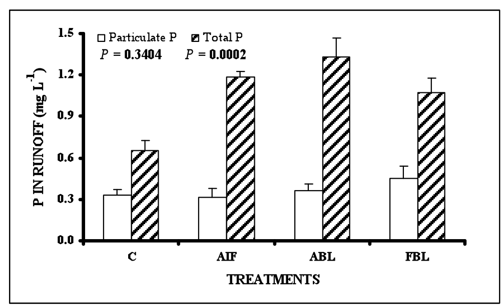


Fig. 4. Average concentrations of particulate P (PP) and total P (TP) in surface runoff during a 30-min runoff event under simulated rainfall

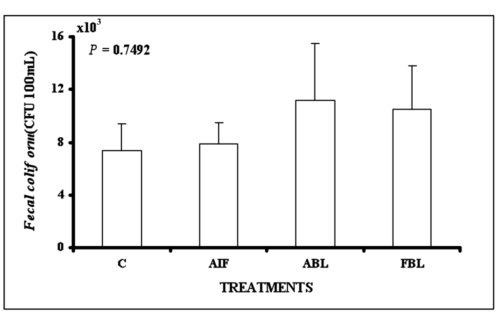


Fig. 5: Average counts of *Fecal coliform* in surface runoff during a 30-min runoff event under simulated rainfall

Backgrounding Systems for Weaned Calves

William S. Swecker, Jr. DVM, Ph.D
Production Management Medicine
Virginia-Maryland Regional College of Veterinary Medicine
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Producers can utilize many feedstuffs to economically grow cattle. Calves are challenged with multiple stresses immediately after weaning or arrival at a backgrounding facility. This stress can result in shipping fever and/or poor gains in the first month after weaning. The relationship between nutrition and disease is bi-directional; that is, animals that do not receive enough feed are likely to get sick, conversely sick animals do not eat and can have increased nutritional requirements. Nutritional management of receiving or post-weaning rations is an important factor in the success or failure of your calf.

In the early 1980's, Martin et al reported on the Bruce County Beef Project, which was an epidemiological study to identify risk factors associated with respiratory disease. They studied a group of calves that moved to feed yards after weaning. They identified several nutrition factors associated with pens of cattle with no mortality.

Hay as the forage
Low energy grains
Not feeding protein
Not feeding NPN
Not giving vitamin injections.
Feeding salt in the loose and block form
Maintaining the water supply clear of straw or hay

In evaluation of these associations, one could conclude that calves don't get sick, but also do not grow very well on a hay-only ration.

<u>The stressed calf and sick calf</u>

"Stressed" calves act differently than normal calves as far as ration intake. Stressed calves can take about 3 weeks to get to normal feed intakes. (Table 1). Sick calves also eat less than healthy calves and this effect seems to persist. The importance of this decrease intake the first weeks or in sick calves is shown in Table 2. We think that a receiving ration should contain X% of protein and Y energy, but this is based on average intakes. We should think again about those diets fed in the first week or to sick calves and think of quality forages or supplements.

Table 1. Effect of health on feed intake of 450 lb. calves

	Healthy			Sick	
Period	lbs/day	% BW		lbs/day	% BW
1-7 Days	7.0	1.6		4.0	0.9
1-28 Days	12.2	2.7		8.2	1.8

Table 2. Nutrient requirements of a 400 lb. calf for different rates of gain

Calf consumes 1% of body weight (4 lbs)

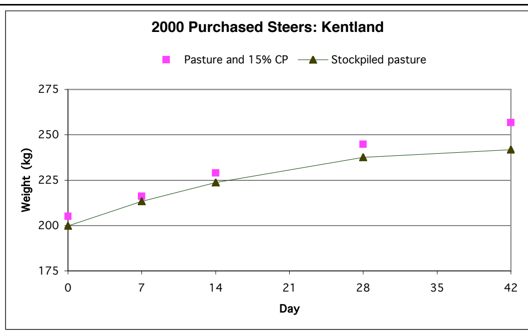
Gain (lb/day)	Protein (%)	NEm (Mcal/lb)
0	15	0.95
0.5	21	1.28

Calf consumes 2% of body weight (8 lbs)

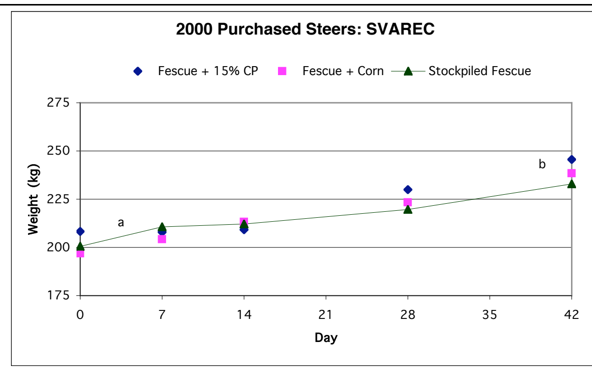
Gain (lb/day)	Protein (%)	NEm (Mcal/lb)
0	7	0.48
1	13	0.76
2	15.2	1.05

Observations from Backgrounding studies SVAREC and Kentland 2000-2002

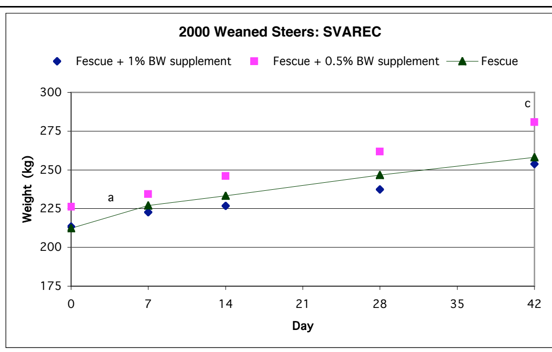
These studies include steers purchased from feed calf sales in Virginia and calves weaned from SVAREC from September / October. The purchased steers were black, medium frame, 4 cwt (205 kg). Day 0 for purchased steers would be the morning after arrival when they were also vaccinated for IBR, BVDV, PI3, BRSV, Clostridial 7-way and a Pasteurella toxoid. They were also dewormed with Moxidectin. Weaned steers and heifers were given the same vaccines 3 weeks prior to weaning and were dewormed at weaning (Day 0). The solid lines on each chart represent calves on all forage diets, usually stockpiled fescue pasture, but one dry lot study with hay. Significant differences in gain are designated on each chart.



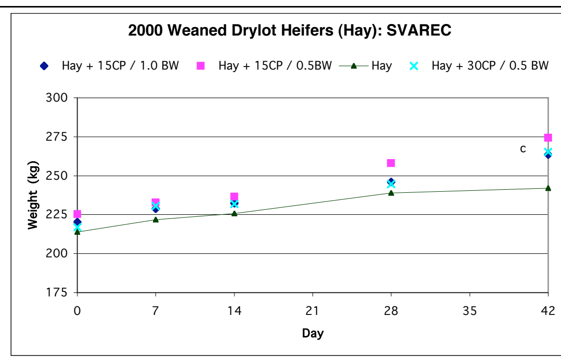
Steers on Fescue gained more d 0-7



Fescue steers gained more d 0-7
Supplemented steers gained more d 0-42



Steers on fescue gained more d 0-7
0.5% BW supplemented steers gained more d 0-42 than 1.0% BW supplement



Supplemented heifers gained more d 0-42 than hay only heifers.

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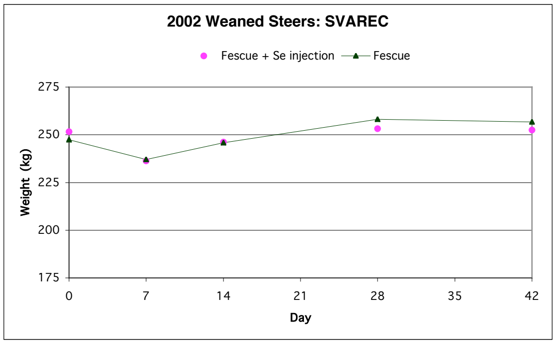
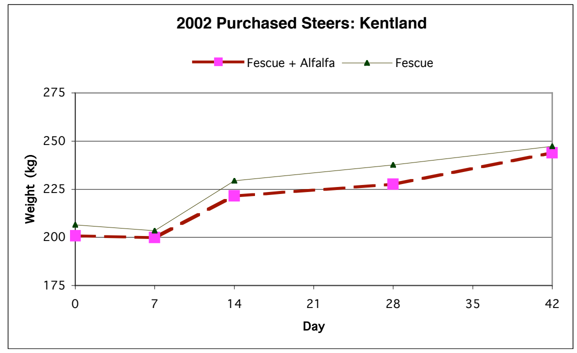
<tr><td>
</td><td>
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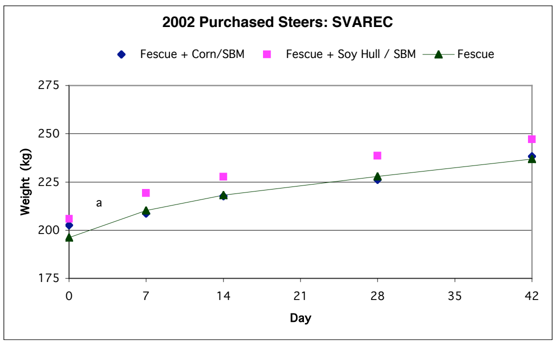
<tr><td>
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<tr><td>Steers on fescue gained more d 0-7 than steers supplemented with corn / SBM</td><td></td></tr>
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Summary of the receiving period

I believe our goals nutritionally for the stressed calf should be:

1. Re -establish rumen function as soon as possible
2. Provide quality nutrients
    a. Stockpiled fescue or fescue-alfalfa worked well for weaned calves
3. Prepare for the next phase of the operation.
    a. Supplemented calves gained more over the 42 days in several, but not all trials. Supplements should be evaluated on a cost return basis

VIRGINIA RAM LAMB EVALUATION PROGRAM

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The Virginia Ram Evaluation Program is one of the longest, continuously operated ram test programs in the United States. The ram test program in Virginia was initiated in the 1960's. In the early years, rams were evaluated at several locations throughout the state. In 1975, the Virginia Sheep Evaluation Station was constructed at the Shenandoah Valley Agricultural Research and Extension Center. The ram test facility (Virginia Sheep Evaluation Station) is owned by the Virginia Sheep Producers Association (VSPA), and the Seedstock Council of VSPA is responsible for decisions regarding its use and for providing finances for its upkeep. Since its construction, the facility has served the Virginia sheep industry by providing a modern facility for performance evaluation, as well as extension and research programs. Over 1600 ram lambs have developed through the facility since its construction. Additionally, a yearling ram performance test was conducted from 1975 through 1993, and the Commercial Ewe Lamb Development Program was initiated in 2000. Numerous sheep research trials have also been conducted at the station during this time.

While numerous changes to the Virginia and U.S. sheep industry have occurred over the years, the primary objectives of the Virginia ram test program have remained constant:

1. To provide a standard, impartial, post-weaning performance test that will furnish records which will be useful to the consignor's breeding program.
2. To provide a source of and market for performance tested rams.
3. To serve as an educational tool for the sheep industry.

Over the last decade, interest in the ram test program has risen as demonstrated by increased breeder participation and strong demand for performance tested rams from commercial sheep producers. The remainder of this paper overview the procedures of the Virginia ram test program.

Entry Requirements and Eligibility

The program is open to Virginia sheep breeders. Registered rams of any breed are eligible, as well as crossbred rams. Registered rams must be recorded with, and have registration papers issued from, a national breed association (rams need not be purebred if percentage rams are recognized and registered by respective breed association). Crossbred rams must be from registered parents of different breeds, and registration papers must be furnished on both the sire and dam. A minimum of three rams of similar age (age difference of not more than 60 days) must be consigned for breed to be eligible. New breeds are encouraged to have at least five rams, and multiple consignors. Rams must be born between September 1 and end of February. Rams must originate from a Virginia Health Certified Flock, or be accompanied at delivery by official health papers stating that the flock of origin is free of contagious disease. Rams must also carry appropriate Federal Scrapie Program identification tag at delivery. Prior to delivery to the station rams must be weaned, vaccinated for clostridium perfringens types C & D, started on feed, and sheared.

Nutrition and Management

Rams are delivered to the Virginia Sheep Evaluation Station in late April. Upon arrival, rams are weighed, vaccinated for soremouth, clostridial diseases, dewormed, have feet trimmed and soaked, and scrotal measurements taken. Rams must meet minimum weight requirements on arrival at the test station. On arrival, rams are evaluated for type, soundness (reproductive, mouth, feet/leg structure), and health (including any foot problems) by a committee and veterinarian. Unsound and unsuitable rams are not accepted. Rams are allocated to one of four test pens based on breed and age. After a two-week adjustment period, the rams started on test. A pelleted ration containing approximately 75% TDN and 14% CP is fed ad libitum for the entire 63-day test. Rams also have access to pasture during the entire feeding period. Rams are dewormed and have their feet soaked every three weeks. Test groups for evaluation of performance are determined by breed and age (ie. fall and winter-born rams evaluated as separate test groups within breed as numbers allow). Weights are taken at the beginning of the test, 21 days, 35 days, 49 days, and off test (63 days). Ultrasonic evaluation for carcass merit/body composition is conducted at appropriate times during the test. At the conclusion of the test and up to sale day, rams are limit fed the complete pelleted ration and have access to pasture. Rams eligible for the sale are sheared.

Sale Requirements

A maximum of 60 rams are sold, with the sale being held the third Saturday in August. Rams must have a minimum ADG ratio of 67, or a minimum WDA ratio of 100 to be eligible for the sale (ratios calculated within breed/age test group). Rams are inspected at the end of the feeding period for structural soundness (including feet/legs and mouth) and type by a committee (appointed by VSPA and a representative of the Virginia Department of Agriculture and Consumer Services). Only rams of desirable type and quality sell. Rams must achieve an acceptable breeding soundness examination rating as determined by the attending veterinarian from the VA-MD Regional College of Veterinary Medicine prior to the sale. The breeding soundness exam includes physical examination, body condition score, genitalia examination, scrotal examination and palpation (including scrotal circuference), and semen examination (motility and morphology). Rams must also test negative for *Brucella ovis* (epididymitis). Only rams free of the spider gene are sold. All rams of all breeds must be DNA genotyped, and confirmed homozygous normal (NN). If more than 60 rams meet the minimum performance requirements, sale numbers are reduced to 60 by eliminating rams according to performance based on a Station Index consisting of 2/3 WDA + 1/3 ADG.

Performance Data

The following performance data is compiled and presented in the sale catalog:

Birth Type: S = single, TW = twin, TR = triplet, QD = quadruplet

Codon 171: Genotype associated with genetic resistance to scrapie. Presence of at least one R is associated with scrapie resistance.

Final Wt.: Ram weight at the conclusion of the 63-day test.

Test ADG: Average daily gain in pounds per day for the entire 63-day test.

ADG Ratio: Expresses ADG for an individual ram as a percentage of the average ADG for all rams in his test group. An ADG Ratio of 100 is average, 110 would be 10% above average, and 90 is 10% below average. Ratios may only be compared on rams that are in the same test group.

Final WDA: Weight-Per-Day-of-Age at the conclusion of the test. Calculated by dividing weight by days of age. Indicative of the ram's growth since birth, and includes growth prior to arriving at the test station (weaning growth) as well as gain on test.

WDA Ratio: Expresses WDA for an individual ram as a percentage of the average WDA for all rams in his test group.

Scrotal Cir.: Actual scrotal circumference in cm measured during breeding soundness exam.

Adj. FT: Ultrasound fat thickness measurement (in.) taken between the 12^{th} and 13^{th} ribs. Adjusted to a constant live weight of 125 pounds.

Adj. REA: Ultrasound ribeye area measurement (square in.) taken between the 12^{th} and 13^{th} ribs. Adjusted to a constant live weight of 125 pounds.

Averages: Averages for all rams that concluded the test. Includes both sale rams and those not selling.

Test Group Rams sell by test group. Within test group, sale order is determined by a gain station index which combines ADG and WDA.

Clover and Alfalfa Variety Evaluation in Virginia Pastures

Ray Smith
Virginia Tech

The quickest way to improve pasture productivity and quality is by adding legumes to existing grass pastures. Not only will yield and quality be improved, but a relatively small percentage of white or red clover (25 to 30%) can significantly reduce fescue toxicosis in endophyte infected stands and dramatically improve animal production. I am often asked which clover variety is the best one to seed into pasture, but I don't have a good answer. Virginia has started one of the first programs in the country to test clovers and alfalfa varieties seeded into existing grass pastures.

Seeding Alfalfa into Tall Fescue

Tall fescue covers more acres that any other cool season grass in the U.S. and alfalfa is the most commonly planted legume. Both species show excellent seasonal distribution with tall fescue extending the grazing season during the early spring and late fall and alfalfa providing an important high yielding, high quality cool season forage during the summer slump period. Alfalfa provides additional advantages by improving livestock gains and diluting fescue toxicosis. On paper these species make the perfect mixture for livestock grazing, but in practice tall fescue often outcompetes alfalfa in a pasture mixture. Orchardgrass/alfalfa mixtures are more common because the bunch type growth of orchardgrass is not as competitive as tall fescue. We are currently evaluating 20 alfalfa varieties.

Locations:

Blacksburg, VA (Central Appalachian Region)
Steeles Tavern, VA (Shenandoah Valley Region)
Glade Springs, VA (Appalachian Valley Region)

Methodology:

1) Sod suppression by heavy grazing for clovers and paraquat for alfalfa.
2) No-till drilled into tall fescue sod at recommended rates.
3) Rotational grazing by beef cows/calves or stockers.
4) Survival measurements 2x per growing season (percent stand and plant counts).

These evaluation trials were planted in the spring of 2002 and 2003. Although there has been some stand thinning of the legumes we have not seen enough differences between varieties to make recommendations. We do not expect to have variety recommendations until the end of 2004.

Recommendations for Broadcast-seeding or Frost-seeding clover

In order for broadcast seeding to be successful, the existing sod must be grazed or mowed short (so you can see your shoe soles when standing on it). During the fall, kill any perennial weeds that are present and apply lime and fertilizer based on current soil test recommendations. Apply the seed from late January to late February (depending on your location) when the sod is not actively growing and when the soil still has a tendency to freeze. Seeding at this time is called "frost seeding" because overnight frosts followed by daytime thaws will bury the seed at a shallow seeding depth. It is essential that seeding occur early enough that you still have several weeks of freezing and thawing to "plant" the seed. Leaving livestock on the area to tread-in the seed may also help. This technique works and it is quick, easy, inexpensive, and can be done on steep, rocky areas where tillage equipment cannot be used.

As the existing sod begins to break dormancy and grow, it is important to graze or mow it periodically to prevent it from crowding out the new clover seedlings. Monitoring of grazing height is essential. When allowing livestock to graze it is vital to prevent overgrazing and damage to new seedlings. Grazing too short will set back new seedlings and have a more detrimental effect than the competition of the existing sod.

Herbicides needed

It is critical to control broadleaf weeds prior to clover reseeding because these weeds cannot be removed selectively with herbicides after the clover is established. Control herbaceous perennial weeds with 2,4-D, dicamba, triclopyr, metsulfuron-methyl, and/or clopyralid in the summer prior to late January-early March clover reseeding. Match the herbicide, rate, and timing of application to the specific weed infestation. See Virginia Cooperative Extension Publication 456-016, *Pest Management Guide for Field Crops*, and/or consult your local Extension Agent for specific chemicals, rates, and intervals from herbicide application to grass or legume seeding. The use of these chemicals will remove any clover remaining in the stand. Control the biennial thistles (bull, musk, curled) while they are in the rosette stage in the late fall or early spring. Observe label restrictions regarding the interval from application to reseeding. These weeds cannot be effectively controlled with summer herbicide treatments. After the clover is re-established, watch for re-infestation by the perennial broadleaf weeds, and spot treat if possible to avoid a general re-infestation.

Improve existing sods by drilling alfalfa

While clover can usually be established by broadcasting seed on the soil surface in the winter, drilling provides even greater assurance of establishment success. On the other hand, it is very difficult to establish most alfalfa and most grasses by broadcasting or frost seeding. When introducing alfalfa to an existing grass stand, it is best to plant with a no-till drill. Conventional grain drills sometimes work as long as they penetrate the soil surface and adequately cover the seed, but make sure not to plant too deep. It is extremely important to have the sod grazed closely, to have adequate weed control, fertility, and soil pH.

If alfalfa is to be established in a strong tall fescue sod, it is helpful to suppress the sod with a low rate of paraquat when the sod is 2-4 inches tall. For spring seedings apply paraquat in October and for late summer seedings apply approximately two weeks before planting. Sod suppression with paraquat is a useful establishment technique for all forage plants. A low rate of glyphosate is sometimes used for sod suppression, but paraquat is generally preferred because it leaves grass stems and leaves very brittle and easy to seed into.

As with broadcasting clover over a live sod, it is also important with drilled grasses and alfalfa to graze the existing pasture stand as growth progresses in order to minimize competition with the new seedlings. If the no-till seeding is a hay field, harvest it for hay early to give the young plants an opportunity to compete with the established plants in the stand.

Seeding Rates and Mixtures to Improve Existing Hay and Pasture Stands	
Mixed Hay	
Plant Species and Mixtures	**lb/acre**
Orchardgrass Red Clover	6-10 3-4
Tall Fescue Red Clover	5-10 6-8
Timothy Red Clover	4-8 6-8
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10
Pasture	
Plant Species and Mixtures	**lb/acre**
Orchardgrass Red Clover Ladino Clover	6-10 4-6 1-2
Tall Fescue Red Clover Ladino Clover	5-10 4-6 1-2
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10

Performance of Cows and Calves on Different Forage Systems

David Fiske, J.P. Fontenot, J.B Hall, W.S. Swecker, and John Fike

Introduction

With over 4.7 million acres of pastureland and over two million head of cattle and calves in Virginia and West Virginia combined, the utilization of forages by grazing livestock is vitally important to the economies of both states. In Virginia alone, the sale of cattle and calves in 2002 contributed almost $350 million to the state's economy and ranks only second to poultry in total agricultural cash receipts.

As part of the Initiative, Pasture Based Beef Systems for Appalachia, the Cow-Calf Forage Systems Project (FS Project) was designed as a systems approach to help improve the profitability and enhance the environmental sustainability of forage-based livestock production systems. The specific objectives of this project are to compare the influence of six different forage systems on: (1) cow and calf productivity (reproduction, growth, and production per acre), (2) forage productivity and sustainability (forage growth and production per acre, pasture plant composition, plant density, and change in pasture ecology over time), and (3) economic profitability and cost of production on a per acre and per animal basis.

Procedure

The FS Project cow herd consists of 108 angus and angus-cross brood cows. Most of the cows are between 2 and 10 years of age. Cows are divided into six treatment groups consisting of six cows per group within each of three replicates. Cows are bred to calve in a 65 day period between late-February and early May. Cows are synchronized, bred AI, and then exposed to a clean-up bull. Angus AI and natural service sires are used. Calves are weaned in early October and moved to the backgrounding phase of the project.

The following is a summary of the six different production systems (treatments) in the FS Project:

System 1 – 2.25 acres/cow (Middleburg 3 paddock system). 45% tall fescue (spring, late fall & winter grazing), 35% tall fescue / clover (hay, late summer and fall grazing), 20% tall fescue / clover (hay, late summer and fall grazing).

System 2 – Same as System 1 except stocking rate of 1.75 acres per cow. 45% tall fescue (spring, late fall & winter grazing), 35% tall fescue / clover (hay, late summer and fall grazing), 20% tall fescue / clover (hay, late summer and fall grazing).

System 3 – 1.75 acres per cow. Two paddock system with rotational grazing. 45% tall fescue (spring, late fall and winter grazing) and 55% in tall fescue clover (hay, summer, fall, & winter grazing).

System 4 – 1.75 acres per cow. Three paddock system with rotational grazing. 45% tall fescue (spring, summer, and stockpiled grazing), 30% tall fescue / clover (hay, late winter, summer, & early fall grazing), 25% orchardgrass / alfalfa (hay, early spring, mid-summer, late fall grazing).

System 5 – 1.75 acres per cow. Three paddock system. 45% tall fescue (graze spring, late fall, & winter), 35% tall fescue / clover (hay, graze early fall for cows and summer for creep grazing calves), 20% switchgrass (summer grazing for cows while calves creep graze TF / CL).

System 6 – 1.76 acres per cow. Three paddock system. 45% tall fescue (stockpiled grazing), 30% tall fescue / birdsfoot trefoil (hay, late winter, summer, & early fall grazing), 25% tall fescue / lespedeza (hay, early spring, mid-summer, late fall grazing).

The different systems were initially seeded in the fall of 1999 and the spring of 2000 in an effort to establish pure stands of the desired pasture grasses and legumes for each treatment. Due to environmental challenges over the past three growing seasons, they still contain a "mix" of pasture grasses. However, with a few exceptions, the fescue in the fescue and fescue / clover pastures is increasing each year.

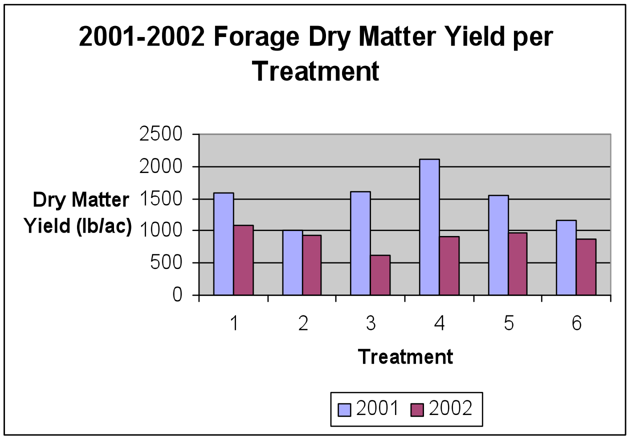
Summary and General Observations

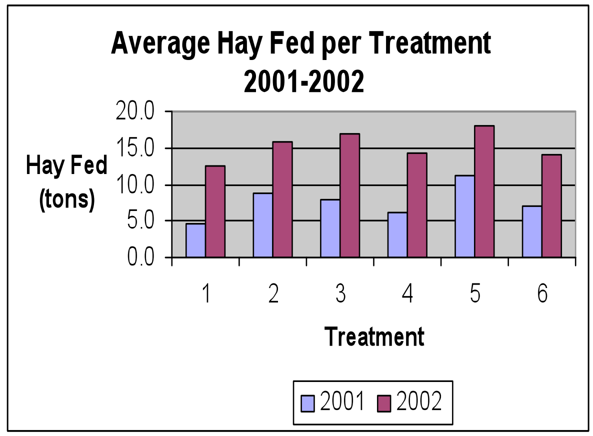
Table 1. Performance of Cows and Calves on Different Forage Systems 2001-02

	Forage system (Treatment)					
Item	***1***	***2***	***3***	***4***	***5***	***6***
Calves						
Avg. steer weaning weight, lb	528	543	479	484	500	475
Avg. heifer weaning weight, lb	463	470	475	472	465	504
Calf weaning weight as a % of cow weight at weaning	45.9%	47.2%	43.3%	45.0%	43.5%	46.0%
Cows						
Pregnancy rate, %	55.56	77.78	88.89	66.67	77.78	66.67
Weight change, lb.[a]	3	59	37	8	21	4
Change in BCS [a]	-1.12	-0.47	-0.61	-0.65	-0.11	-1.20

[a] Change from calving (May) to weaning (October)

- Although there appears to be differences between the replications, initial data suggests that there are no differences in calf weaning weights or cow performance between any of the six different treatments.
- Overall forage dry matter yeilds were reduced by almost 40% in 2002 as compared to 2001 due to extremely dry weather during the growing season. As a result, hay consumption increased over 100% in 2002 as compared to 2001.
- Stockpiled forages for fall and winter grazing in 2001 and 2002 were greatly reduced due to dry conditions, thus requiring additional hay feeding.





- Overall, conception rates have been less than desirable for all treatments and replications. Bull rotation was implemented in 2003 as one way to help improve conception rates.
- With the exception of the first year of the project, legumes have been difficult to establish. The prolific stands of red clover in the summer of 2000 was detrimental to the fescue establishment in two of the replicates..
- Due to the grass competition, both lespedeza and birdsfoot trefoil have been slow to establish.
- Warm season grasses have also been difficult to establish due to adverse environmental conditions. Early attempts to establish Caucasian bluestem failed, resulting in the change switchgrass.
- Weed control, primarily thistle and horse nettle, have been a problem each year.
- Although more labor intensive, we have been able to graze the rotational paddocks longer into the grazing season, especially the treatment containing alfalfa/orchardgrass. Also, visual observation suggests that forage utilization seems to be better in the rotationally grazed paddocks.

The first three years of the Cow-Calf Forage Systems Project have definitely been a “learning experience” for all involved. Unforeseen weather problems, low conception rates, and less than desirable forage establishment success have created difficult challenges for the project. As we progress with the project over the next several years and achieve the desired mix of forage species and overcome some of the unforeseen obstacles, differences may emerge between the different treatments, forage species, and grazing management intensities.