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2017 NFREC Beef/Forage Day



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2017 NFREC Beef/Forage Day

Schedule of events (CDT):

8:00 AM **Registration (Registration fee - $10) and interact with exhibitors**

9:00 AM **Start morning program**

- **Integrating rhizoma peanut into grazing systems**
  - Dr. Jose Dubeux, UF Forage Specialist
- **Brunswickgrass Overview**
  - Dr. Ann Blount, UF Forage Breeder
- **TOWARDS A MORE NITROGEN EFFICIENT SOIL**
  - Dr. Cheryl Mackowiak, UF Soils Specialist
  - Dr. Sunny Liao, UF Soil Microbial Ecology Specialist
- **Weed Walk: Identification and Control**
  - Dr. Brent Sellers, UF Specialist
  - Mark Mauldin, UF/IFAS Washington Co Extension Agent
- **Balancing Hay Diets with Commodities**
  - Dr. Nicolas DiLorenzo, UF Beef Specialist
  - Doug Mayo, UF/IFAS Jackson Co Extension Director
- **Cracking the Bull Buying Code**
  - Kalyn Waters, UF/IFAS Holmes Co Extension Director
- **Carcass merit of current US fed beef offering**
  - Dr. Chad Carr, UF Meat Extension Specialist

12:30 PM **Lunch (Lunch and refreshments will be provided)**

1:30 PM **Optional Forage Variety Demonstration Tour**

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TOWARDS A MORE NITROGEN EFFICIENT SOIL

Cheryl Mackowiak[1], Hui-Ling (Sunny) Liao[1], and Jose Dubeux[2]

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Introduction

Nitrogen (N) fertilizer is often applied in large amounts, which also makes it our greatest fertilizer cost when managing pastures and hay fields. Although N makes up the majority of our atmosphere, almost all of the N found in soil exists in organic forms that are unavailable to plants. Florida soils may contain 500 to 3,000 lbs total N per acre, or more. However, only about 0.1% of the total N exists as inorganic, plant available N (PAN). Soil PAN exists as inorganic ammonium (NH_4-N) and nitrate (NO_3-N) that are taken up by plants and used to form proteins and promote forage growth (Fig. 1).

Soil microorganisms

Converting soil native organic N to PAN requires mineralization processes that are mediated by soil microorganisms. Estimates suggest that up to 85% of PAN from soil organic matter is provided by soil microorganisms. Different groups of microorganisms contribute to different stages of the terrestrial N cycle (Fig 1). For example, some groups of saprophytes primarily take up organic N (i.e. urea, amino acids), some prefer inorganic N found in the soil (i.e. ammonium, nitrate) while others can fix atmospheric N_2. The specific groups of microorganisms [i.e. Abuscular mycorrhizal fungi (AMF) and Rhizobia (a bacteria)] live in plant tissues to form symbiotic relationships. Arbuscular mycorrhizal fungi colonize almost all land plants. These microbial symbionts serve as natural biofertilizers producers that can biochemically transform soil N to PAN. The cell-to-cell communication between these symbionts and their host plants allows the plant to directly uptake the PAN from microorganisms. The symbionts also help plants with uptake of phosphorus, water, and other mineral nutrients (i.e. plant micronutrients zinc, copper and iron). Through mycorrhizal fungi chemical reactions, they convert phosphorus, iron and other bound soil nutrients into plant available forms. In addition, many mycorrhizal fungi can enlarge the surface absorbing area of roots by over 100-fold. This greatly improves plant access to mineral resources. Bacteria living in nodules that have formed on legume roots can convert N from atmospheric N_2 gas into PAN. External N fertilizer applications alter the quantity and forms of soil

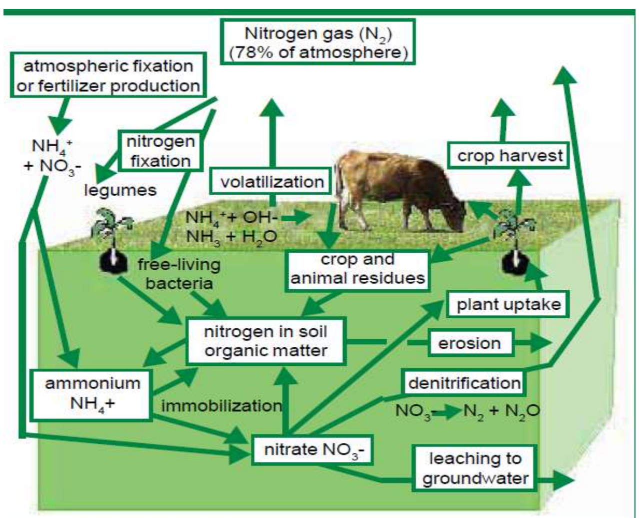

Fig. 1. Simplified N cycle in a pasture. Taken from Bellows, 2001 (ATTRA/Nutrient Cycling in Pastures).

N, including PAN, which often leads to significant fluctuations in soil microbial structures and function, particularly as it relates to N cycling. Consider that each teaspoon of healthy root-zone soil can harbor over 1 billion microorganisms! Our soil is alive! Repeated, heavy treatments of chemical fertilizers impact soil microbial community structures and sometimes hinders the ability of soil microorganisms to provide beneficial services.

Organic N fertilizer use

In addition to soil native organic N, we can apply organic N fertilizers, such as manures, poultry litter, biosolids, etc. and utilize the microbe-mediated mineralization processes to release more PAN. Mineralization rates vary among different organic fertilizer sources. The proportion of N released from organic N fertilizers as PAN during the first year of application is approximately 35% for cattle manure, 20% for horse manure, 70% for poultry litter, and 60% for biosolids (what used to be called sludge). Of course, these values may shift a little higher or lower, depending upon soil moisture, temperature, and variations in initial product composition. For example, poultry litter from layer operations may mineralize N (releasing PAN) 15% faster than litter from broiler operations. Dried, Class AA biosolids may mineralize somewhat slower than Class B biosolids. Typically not all of an organic product's N is mineralized to PAN during the year of application. What is not mineralized during the year of application will continue converting to PAN over succeeding years. For example, manures and litter may release another 10 to 20% of the original N as PAN in the second year and 5 to 10% in the third year. Although reports are sparse, biosolids N mineralization likely follows a similar trend. In comparison, green manures (most annual legume forages, such as clovers, vetch, winter pea, cowpea, soybean) provide PAN within a month or two after the biomass dies, particularly if it is incorporated into the soil. Perennial legume (such as rhizoma peanut) root turn- may also provide some PAN to grasses.

Inorganic chemical N fertilizer use

Under more sustainable systems, we can harness N_2-fixing microbial processes to help fertilize our grasses but when growing grass hay or production intensive systems that have high initial N fertilizer demands, we often need to turn to chemical fertilizer sources, such as ammonium nitrate, ammonium sulfate, diammonium phosphate, etc. These fertilizers are water soluble and quickly release PAN into the environment. Urea-N as either dry or liquid formulations also results in a quick release of PAN. However, the organic urea first requires that it mineralizes to inorganic N. The bacteria required to perform these processes exist naturally in the environment and conversion to PAN is quick (a matter of a few days). Urine deposited by livestock undergoes the same conversion processes.

Amount of N in different fertilizer sources

Not all fertilizers contain the same amount of N, so application rates are going to vary. Inorganic mineral fertilizers have relatively high N content. Dry urea contains 46% N by weight, ammonium sulfate contains 21%, and diammonium phosphate contains 18% N. In comparison, dry poultry litter often contains 3% N and Class AA biosolids contain 6% N. Cattle manure may contain nearly 2% N on a dry matter basis. Fresh manure may be less than half that amount. The USDA estimates manure N contributions from cattle of approximately 0.31 lbs N per day per 1,000 lbs animal unit. Based upon the N composition, you will often need to apply mineral fertilizers at rates of pounds per acre, whereas biosolids, litters and manures will be applied at 1 ton or more per acre rates to meet equivalent N application rates. Composted products will contain even lower percentages of N than manures and litter, and often the N mineralization rates of composted products are slower.

How to build a more N efficient system

The 4 Rs of N fertilization are Right source, Right place, Right rate, and Right time. By following these guidelines, you will be conserving your N inputs, regardless of soil type and crop demands. **Right N source** may entail that you consider slower release or controlled release N sources to minimize N losses. In the Florida Panhandle, some locally available controlled release products may include sulfur and polymer coated urea. Urease inhibitors and nitrification inhibitors are also used to treat urea fertilizer to slow the conversion from organic urea to PAN. Nitrate is especially susceptible to rain and irrigation induced leaching losses. Nitrogen mineralization is a relatively slow process, so use of organic-based fertilizer sources (except untreated urea) will reduce the chance for N losses to the environment. **Right placement** is not as easy to implement in pasture and hay production systems, since broadcasting fertilizer onto the sward is the most viable option. However, you might consider incorporating N fertilizer into the soil when growing annual forages on tilled land. A minor number of producers have returned to injecting anhydrous N into pastures or hay fields. Injector depth (> 3 inches) and spacing (closer is often better) are important considerations. Other considerations include cost and availability. **Right rate** is easy to implement if you follow IFAS fertilization recommendations (http://edis.ifas.ufl.edu/ss163) for your forage production system. Typically 50 lbs N/acre per application for pastures and up to 80 lbs N/acre per hay cutting are standard practices. **Right time** for pastures is often followed by applying the first N application after spring green-up and we advise against applying N fertilizer past August, unless it is being used to create stockpile forage. Applying fertilizer soon before a light rain might be beneficial if you are applying urea N to minimize volatilization losses, but this will not be good if you get excessive rainfall. Other dry chemical N fertilizer sources have minimal N volatilization loss potential. Applying N during a drought will likely not promote much, if any forage growth and you risk the chance of livestock nitrate toxicity.

Build soil carbon (organic matter) is an effective way to improve your pasture and its ability to retain N. Soil organic matter (SOM) is a complex combination of carbon-containing compounds derived from living and dead plants and animals. Over 99% of soil N is organically bound in SOM and living organisms. Increasing SOM increases soil N content and therefore more N is potentially available for use. Both, SOM quantity and quality are important for plant nutrient cycles. As mentioned above, soil microorganisms can contribute significantly to plant N uptake. These microorganisms also respond to soil carbon and atmospheric carbon dioxide (CO_2). Building SOM improves biodiversity and richness of specific groups of saprotrophic microorganisms. These saprophytes break down and transform the complex organic molecules into simpler compounds and release plant nutrients through decomposition and mineralization. For example, actinomycetes can effectively break down complex substances (i.e. cellulose and chitin), whereas filamentous saprophytic fungi primarily mineralize cellulose, lignin and phenolic compounds. Besides the main components of plant cell wall (cellulose, lignin), the SOM also consist of polysaccharides, polyphenols, lipids, peptidoglycan, peptides and others. Further transformations result in various humic substances. Different groups of soil microorganisms have the ability to degrade different types of humic components, thereby improving the quality of SOM available that can potentially move towards optimizing the soil microbial community function. For example, the quality of SOM can shift the dominance of various decomposers that are associated with soil nutrient cycling processes.

Adding grazing has a direct impact on pasture roots, soil C, N, and microbial biomass. In general, the animals remove C/N nutrients from the grass into their own biomass, which temporarily removes C and N from the pasture. However, animal excreta contributes significantly to the quality and quantity of SOM. Grazed vegetation can rapidly be decomposed through animal digestion and return to the soil as PAN via feces and urine. The feces contains approximately 20% of its total N (or about 8 lbs per dry ton) as PAN, with the remainder as organic N that can eventually be converted to PAN through mineralization. Specific groups of cattle derived microorganisms (i.e. Bacilli, Clostridia, Bacteroidetes) can efficiently decompose forage into plant-available nutrients. Thus, grazing can benefit the abundance and activities of soil microorganisms, resulting in improved soil health and increased nutrient cycling.

Historically, it was thought that much of the SOM came from the decomposition of above-ground plant biomass, but it is becoming apparent that below-ground roots contribute a much larger proportion to soil organic matter. Therefore, one might suspect that grazing negatively impacts pasture forage root growth, thereby lessening SOM development. In over-grazed systems, this is actually the case. However, under good grazing management where a low amount of grazing pressure is allowed or implementing a reasonable rest period (approximately 4 weeks in North Florida) via rotational grazing, we gain the benefits of deep, massive pasture grass roots and animal excreta contributions (Fig. 2). We often find deep roots in hay fields, as well, because the period between hay removals allows for ample root regrowth.

Fig. 2. Bermudagrass managed as A) no grazing, B) repeated removal of 50% forage, C) repeated removal of 80% forage.

One of our broader goals is to design more sustainable forage-based, agricultural systems through harnessing the benefits of deep-rooted forages and livestock grazing to help improve the sustainability of other commodity production systems. These other production systems are often water and nutrient inefficient, and they tend to degrade the soil. At NFREC, Marianna, we propose to measure the relative benefits a sod-based crop rotation/grazed system provides compared to using winter cover crops, with grazing versus without grazing, and winter fallow on succeeding summer row crop production and soil health, including the soil N cycle and water conservation. We will also test different grazing intensities, since this may significantly impact root biomass and therefore soil health and related soil functions.

Brunswickgrass (*Paspalum nicorae*): a weed contaminant in southern pastures and bahiagrass seed production fields

Ann Blount, Marcelo Wallau, Brent Sellers, Anthony Drew, Jose Dubeux, Cheryl Mackowiak and Joao Vendramini

General: Brunswickgrass (*Paspalum nicorae* Parodi), sometimes referred to as a "Brown seeded paspalum", is becoming a problematic weed in summer perennial grass pastures in the southeast. This plant is native to southern Brazil, northern Argentina, Paraguay and Uruguay. It was introduced into the U.S. as a soil conservation plant for erosion control and as a potential forage crop. Brunswickgrass is well adapted to moderately acid, sandy soils, but it also grows well in sandy loam and well-drained, light to medium clay-based soils. This plant has become naturalized and is contaminating bahiagrass seed production fields and pastures in Florida, Georgia and Alabama. The plant is competitive with bahiagrass and bermudagrass. Since it is less palatable, it can eventually dominate a perennial grass pasture. Brunswickgrass has reportedly contaminated bahiagrass seed fields and pastures in several Florida counties, including Gilchrist, Levy, Alachua, Citrus and Sumter.

During the seed cleaning process, Brunswickgrass seed does not readily separate from 'Pensacola' bahiagrass seed. Its seed is close in size to that of Pensacola bahiagrass. This has made it difficult for bahiagrass seed processors to effectively eliminate Brunswickgrass to meet total weed seed specifications (2.0%) for saleable seed. It is believed that Brunswickgrass is more readily removed from Argentine than Pensacola bahiagrass due to seed size differential.

Not harvesting production fields contaminated with Brunswickgrass is the best preventive action a producer can take to avoid further distribution of this grass. It is important to remember that large quantities of bahiagrass seed are sold without any field inspections for purity, resulting in the sale of some contaminated seed for use in new pasture plantings. When purchasing seed to establish new pastures, purchase from reliable seed sources.

Cattle grazing Brunswickgrass will consume the grass when it is young and tender; however, it quickly becomes rank and loses its palatability, causing cattle to avoid it. It proliferates when the more desirable forages have been grazed out. As it thrives under reduced competition, it spreads and becomes a more difficult weed to eradicate in a pasture situation. Pastures contaminated with this grass will appear to have tufts or hills of plants where cattle refuse to graze. If the plant produces a seed head, it is relatively easy to recognize it. There are no known selective herbicides that are effective in removing Brunswickgrass from established bahiagrass pastures. Total field renovation with glyphosate or cultural (mechanical) methods may need to be used to destroy a contaminated stand.

Appearance: Brunswickgrass is a perennial summer grass, with a similar growing season and appearance to that of bahiagrass. It is synonymous to *P. plicatulum* Michaux. var. *arenarium* Arechav., and it is closely related to bahiagrass (*Paspalum notatum* Flüggé). Brunswickgrass looks similar to Pensacola bahiagrass (*P. notatum var. saurae* Parodi), but it often has 3-4 racemes per seed head, compared to bahiagrass with typically 2 to 3 racemes (Hitchcock, 1971) (Fig.1).

Figure 1. Seed head of Brunswickgrass and seed (left) (courtesy of Bruce Cook, CIAT) and Pensacola bahiagrass (right) (courtesy of Carlos Acuna, UNNE).

Brunswickgrass has a deep and aggressive rhizome system that appears very different from bahiagrass rhizomes. Brunswickgrass rhizomes occur below the soil surface (approximately 4 inch or 10 cm depth) and spread laterally, while bahiagrass rhizomes (sometimes referred to as stolons), spread along the soil surface (Fig. 2).

Figure 2. Rhizome comparison of Brunswickgrass (left) and Pensacola bahiagrass (left center). Whole plant of Brunswickgrass with leaves and rhizomes (far right).

Seed are slightly smaller than that of Pensacola bahiagrass, and the seed coat has a dark, chestnut brown center that varies somewhat in size by variety. Seed, under close observation, are noticeably convex in shape compared to the relatively flat, tan colored seed of Pensacola (Figs. 3 and 4). Seed may average about 200,000 per pound, based on our estimates.

Figure 3. Seed of Brunswickgrass (left) and Pensacola bahiagrass (right).

Figure 4. Close up of seed of Brunswickgrass (left).

Variety/Germplasm: Two seed sources were released and promoted for conservation plantings by the Soil Conservation Service (presently Natural Resource and Conservation Service-NRCS), from Plant Materials Center-Americus, GA (Belt and Englert, 1999 and NPGS GRIN GLOBAL, 2016). 'Amcorae' (Origin: Argentina, Source: PI 202044, CPI 21370, ATF 1040) is a blueish green, vigorous introduction released in 1969. A later release, 'Doncorae' (Origin: Brazil, Source: PI 310131, CPI 125877, ATF 1028) occurred in 1993. It has rapid seedling establishment, vigorous growth habit and winter hardiness.

Eradication: Brunswickgrass is tetraploid, similar to Argentine-type bahiagrass. Control of this grass is more difficult because of its higher ploidy level, making it more difficult to eradicate with herbicides. To our knowledge no herbicides currently exist that will selectively remove Brunswickgrass without severely injuring or killing the desirable pasture grass. Therefore, high rates of glyphosate will likely be required to kill the pasture as the first step of total renovation. Mechanical cultivation alone may not eliminate Brunswickgrass. Mechanical cultivation, in addition to herbicides and crop rotation, may provide successful control of Brunswickgrass, since seed survival in a soil seed bank is not believed to be long-term.

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Integrating rhizoma peanut into grazing systems

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Introduction

Nitrogen is one of the major off-farm inputs in livestock systems, either as N fertilizer or as purchased feed (e.g. soybean, cottonseed meals). The good news is that you can reduce those expenses by growing your own nitrogen using forage legumes. Rhizoma perennial peanut (RP) is a legume adapted to the Florida environment and it grows well in mixtures with bahiagrass. When grown in pure stand, RP associates with soil bacteria and fixes up to 200 lbs N/acre from atmospheric nitrogen, depending on the variety (Dubeux et al., 2017). In mixtures, this amount is expected to be lower because of lower participation of the peanut in the botanical composition, but it still might range from 50 to 100 lbs N/acre per year in well-established mixtures. Nitrogen fixed by the legume is recycled back to the soil via cattle excreta and plant litter, acting as slow-release fertilizer. As a result, companion species in the mixtures, such as bahiagrass, can get the benefit of the fixed N. Rhizoma perennial peanut also has better nutritive value than bahiagrass. Typically, bahiagrass has digestibility ranging from 48 to 52% and crude protein from 8 to 12%. Rhizoma peanut has digestibility ranging from 68 to 72% and crude protein from 15 to 18%. This difference is large enough to result in a significant increase in cattle average daily gain on RP.

Establishing a RP stand takes time. Under a good management program (i.e. weed control and fertilization) and adequate soil moisture, RP can be established in one year. We currently recommend strip-planting RP in order to reduce the cost of establishment and facilitate weed control. After establishment, well-managed RP pastures are expected to last for more than 30 years. Integrated RP-bahiagrass pastures will reduce N fertilizer inputs and enhance livestock performance, not only reducing production costs, but also minimizing environmental risks associated to N fertilization.

Varieties and establishment

Many varieties and germplasms are available in Florida, but Florigraze and Ecoturf have been tested more extensively under grazing. Recent research has demonstrated better productivity with Ecoturf, compared to Florigraze (Dubeux et al., 2017), therefore, we recommend Ecoturf to integrate into grazing systems.

Rhizoma perennial peanut is vegetatively propagated, and rhizomes are used as planting material. Typically, 80 bushels of rhizomes are used to establish 1 acre. Rhizomes should be dug and planted within the same day, in order to assure good establishment. Soil moisture is critical during RP establishment. In the Florida Panhandle, RP can be planted in early spring, as long as enough soil moisture is available. May is typically dry and should be avoided, unless irrigation is available. Well-drained sites are recommended for RP establishment. Target soil pH is 6 and other nutrients should be applied following IFAS recommendation for RP (http://edis.ifas.ufl.edu/pdffiles/SS/SS16300.pdf).

Strip-planting RP can reduce establishment cost because only 50% of the total area is planted. Matching the width of the RP strip with the equipment width (e.g. spriggers, sprayers, haying equipment) is a practical option. At UF-NFREC in Marianna, we planted RP strips 9-ft. wide between 9-ft. wide bahiagrass strips. If bahiagrass pastures are already established, the existent sod must be killed with glyphosate prior to planting the RP into them (Figure 1). This can be done in the previous fall, and if needed, reapply glyphosate prior to planting in the spring. If bahiagrass and RP are being established at the same time, it is important to prepare the seedbed and plant both species in early spring, if soil moisture is available. Commercial sprigger servicees are available if necessary. Equipment for planting includes digger and sprigger (Figure 2).

Figure 1. Glyphosate application to prepare strips in order to plant rhizoma perennial peanut. Photo credit: Jose Dubeux

Figure 2. Rhizoma perennial peanut digger (A) and sprigger (B). Photo credit: Jose Dubeux

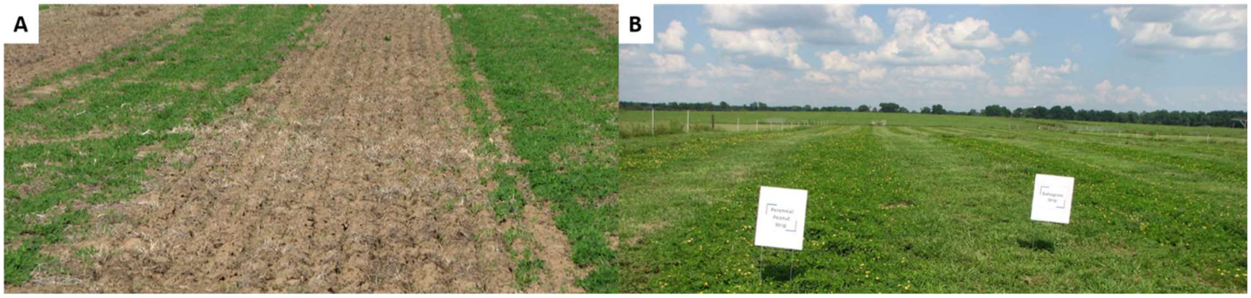

Figure 3. Strip-planting of RP and bahiagrass during the establishment year (A) and one year after established (B). Photo credit: Jose Dubeux

Weed management

Once established, it is critical to manage the weeds. Strip-planted RP allows for the use of RP labeled herbicides while minimizing potential damage to the neighboring grass strips. Imazapic is labelled for use in RP stands in Florida and it has demonstrated good response during the establishment period (Castillo et al., 2013). Recommended rates are 4 fl.oz/acre, and should be used as a pre-emergent/early post-emergence herbicide. If grass weeds are a problem, clethodim products can also be used, following label recommendations. Recently, Glystar Plus, a glyphosate product, was labelled for use in established perennial peanut grown for hay in Florida. Glystar can be applied during the dormant season to control winter weeds, during the growing season as a wiper application or even broadcasted if other options are not available. However, injuries will occur when used during the growing season, but the crop should recover 40 to 60 days after application. Stands during the establishment year should not be sprayed with Glystar. The complete recommendation for weed management on RP is at http://edis.ifas.ufl.edu/wg216 . During the establishment year, Castillo et al. (2013) observed a positive effect of 45 lbs N/acre during the first year of RP establishment. The N application resulted in faster ground cover and increased RP establishment, as long as weeds were adequately controlled.

Grazing management

Ecoturf perennial peanut is tolerant to grazing. We have continuously stocked our pastures for the last three years (2015, 2016, and 2017) and the strip-planted RP is performing well year-after-year. Average stocking rate in the first experimental year was 1.5 steers (avg. 700-800 lbs/steer) per acre, with an average daily gain of 1.4 lbs/head/day and no supplementation except mineral salt. In 2016, we compared three different grazing systems: 1) bahiagrass fertilized with 100 lbs N/acre during the warm-season overseeded with a mixture of rye/oats (50 lbs. each) + 100 lbs. N/acre during the cool-season, totaling 200 lbs N/acre/year; 2) unfertilized (no N) bahiagrass during the warm-season overseeded with a mixture of rye/oats (50 lbs each) and a blend of clovers (crimson, red, and ball, at 15, 6, and 3 lbs/acre, respectively) +

30 lbs N/acre during the cool-season, totaling 30 lbs N/acre/year; 3) unfertilized (no N) bahiagrass + strip-planted rhizoma peanut during the warm-season overseeded with a mixture of rye/oats (50 lbs each) and a blend of clovers (crimson, red, and ball, at 15, 6, and 3 lbs./acre, respectively) + 30 lbs N/acre during the cool-season, totaling 30 lbs N/acre/year. Preliminary results from the first year indicated similar livestock performance (measured as weight gain) when grazed on the grass-legume system (608 lbs/acre) as compared to the N-fertilized grass system (600 lbs/acre) (Table 1). Therefore, integrating forage legumes (RP during the warm-season and clovers during the cool-season) reduced N fertilizer inputs from 200, down to 30 lbs N/acre/year, while maintaining similar livestock performance.

Take home message

Integrating rhizoma perennial peanut into grazing systems reduces the need of N fertilization and feed supplementation during the warm-season. Strip-planting is a viable option to reduce rhizoma peanut establishment cost compared to a RP monoculture, and it also helps to facilitate weed management, compared to sprigging into a living grass stand. Overseeding warm-season grass-legume pastures with a blend of cool-season grass-legume mixtures extended the grazing season and resulted in livestock performance equivalent to N-fertilized grass systems. Minimizing N fertilizer inputs reduces not only ranch production costs, but also some of the environmental problems related to the use of N fertilizers.

Figure 4. Established strip-planted Ecoturf rhizoma perennial peanut-Argentine bahiagrass pastures under grazing at UF-IFAS NFREC in Marianna, FL. Photo credit: Jose Dubeux

Table 1. Livestock performance in different grazing systems in North Florida; preliminary data from 2016

System		Livestock responses from 8 January to 28 October, 2016		
Warm-season	**Cool-season**	**ADG (lbs/head/d)**	**Stocking rate (steers/acre)**	**Gain per area (lbs/acre)**
Fertilized bahiagrass + 100 lbs N/A	Cool-season grass + 100 lbs N/A	1.2	1.8	600
Unfertilized bahiagrass	Cool-season grass/legume mixture + 30 lbs N/A	1.1	1.6	510
Bahiagrass/Rhizoma peanut mixture	Cool-season grass/legume mixture + 30 lbs N/A	1.4	1.5	608

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Efficient Pasture Weed Management

Dr. Brent Sellers[1] and Mark Mauldin[2]

UF/IFAS Associate Professor Agronomy (Weed Science) and Associate Director Rang Cattle Research and Education Center[1] and UF/IFAS Extension Agent, Washington County[2]

The goal of a pasture weed management program should be to increase forage production and ultimately improve the financial viability of the operation. With that in mind, potential weed management programs should be evaluated on their potential to generate positive financial returns.

Weed management programs are just that, programs; not individual activities. These programs involve several key factors, including grazing management, soil fertility management, and control practices for existing weeds. If any of these factors are not properly addressed the weed management program will not yield maximum financial returns. While grazing management is a crucial aspect of any weed management it was not specifically addressed in the weed management demonstration at the 2017 NFREC Beef & Forage Field Day.

Soil Fertility's Role in Weed Management

A vigorously growing sward of forage is the best prevention for pasture weeds. Forage growth is restricted if soil fertility is inadequate. Florida's soils are generally deficient in one or more nutrients making fertilizer applications necessary. With forage grasses, the greatest growth responses are associated with the application of fertilizers containing nitrogen. Soil pH and the plants' demands for other nutrients cannot be ignored or the long-term health and economic viability of the pasture will be significantly compromised. Specific pasture fertilization recommendations should be generated based on the laboratory analysis of representative soil samples. For more information see http://edis.ifas.ufl.edu/ss163

Maintaining adequate soil fertility will help prevent pasture weeds. However, if you already have established populations beginning a fertility program may not reduce the weed pressure and in some cases may actually make the condition worse. In short, **fertilizing will not get rid of weeds**. If weeds are established, they will take advantage of fertilizer applications just like forage plants. Fertilizer applications help maximize forage growth enabling forages to out compete weeds prior to their establishment and to rapidly fill in areas left vacant when weeds are controlled, preventing new infestations. Soil fertility is an essential part of any pasture weeds management program. If soil fertility is not addressed forage production will be limited regardless of other practices. If forage production is limited by inadequate soil fertility, it is highly unlikely that any weed management program will be financially viable.

Controlling Existing Weeds

There are a variety of techniques used by ranchers to control existing pasture weeds. The two most common methods are herbicide applications and mowing.

Mowing – simple and produces immediate, visual results. Mowing does not differentiate between forage species and weeds; grazable forage is mowed along with weeds. In order to reduce the amount of forage lost due to mowing, weeds are commonly allowed to get rather large (taller than the grass) before they are mowed. Often, weeds of this size have already set seeds. When this is the case, mowing spreads the seeds, essentially planting next year's crop of weeds. Additionally, allowing weeds to grow gives them time to compete with desired forage and reduce total forage production. In terms of reducing forage production, weeds mowed late in the summer have already done their damage for the year. With the previously mentioned limitations in mind, annual weeds can be controlled by mowing, if they are cut low enough; a single mowing will not control perennial weeds, like blackberry.

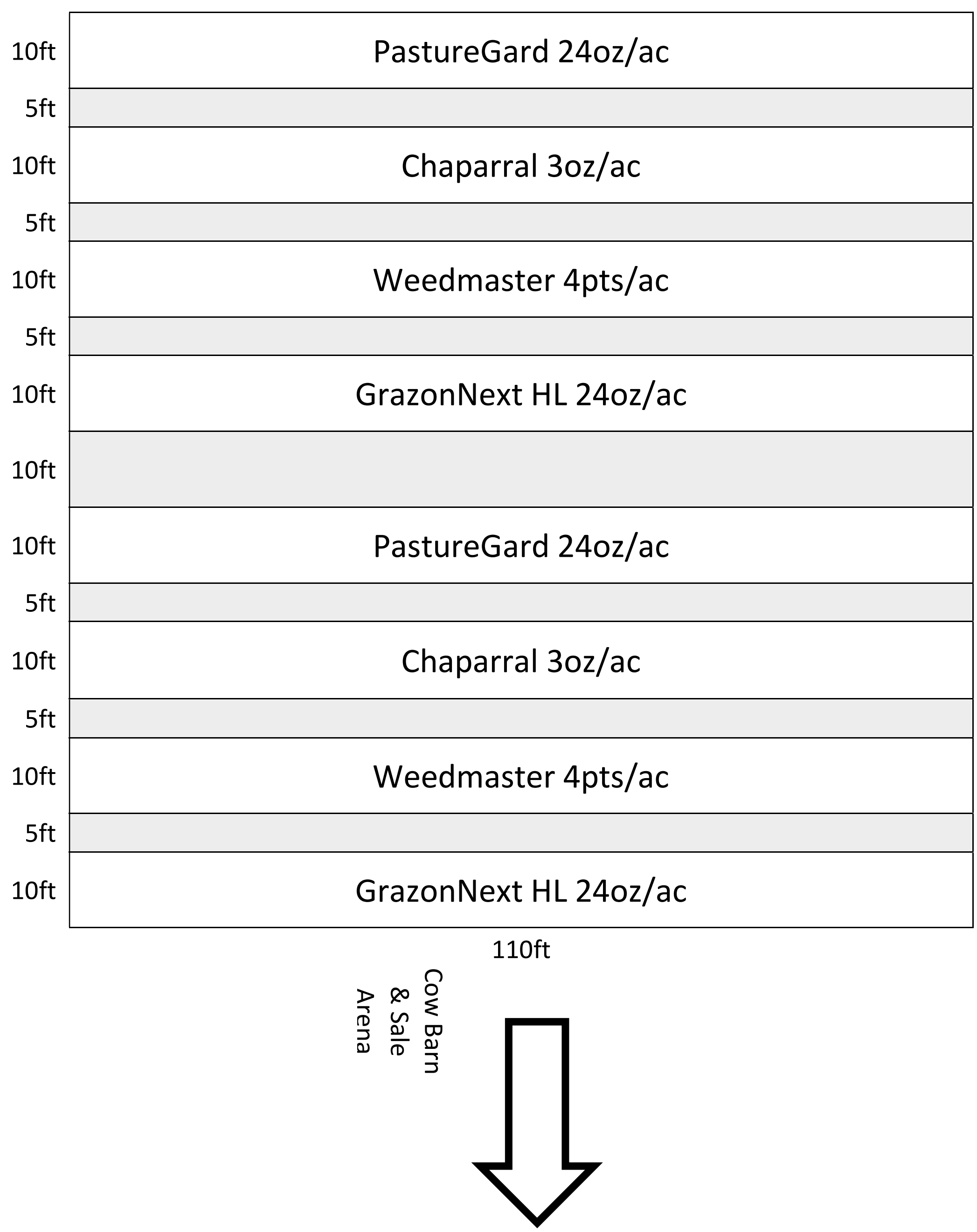
Herbicides – have the ability to eliminate existing weed populations, prior to seed production, without damaging desirable forages. However, herbicides are somewhat more complicated than mowing and the results of an application are not immediately visible. For an herbicide application to be effective and financially viable the appropriate product must be selected and applied correctly. When selecting the appropriate product there are several factors that must be considered.

1) **Efficacy on existing weed population**. If a product is ineffective on the weeds you have, clearly it would not be a financially prudent choice to apply it. Understanding efficacy of a product requires that you know exactly what weed species you are trying to control and on which species a given product is effective. For more information see http://edis.ifas.ufl.edu/wg006
2) **Tolerance of forage species.** Not all forages tolerate all pasture herbicides. In some cases the product that has the greatest efficacy on a specific weed will also injure the surrounding forage species. For example, Pensacola type bahiagrass will be severely injured by herbicides containing metsulfuron (MSM60, Chaparral, Cimarron, etc.). The products are very effective on many weeds but should not be used in bahiagrass. If killing weeds reduces or eliminates forage production the efforts will not generate a positive financial return.
3) **Price** of herbicides must be considered. In some situations the forage may be tolerant of multiple products with acceptable efficacy on the problem weeds. In these situations price becomes a key factor in product selection. Herbicides should be evaluated in terms of price per acre. The price of a single retail unit (bottle, jug, box, etc.) is not meaningful until it is considered in light of how much pasture it will treat. To determine the price per acre of a specific product the intended use rate must be known. In some cases product use rates vary considerably based on the targeted weed species. Yet another reason to be sure you know exactly what weeds you are battling.

There is a product cost associated with herbicide applications that is not associated with mowing. However when comparing the two options there are factors beyond product cost that should be considered. In terms of labor and equipment costs spraying is generally more economical than mowing. Spraying is faster. Assuming comparable tractors, sprayer booms are typically much wider than rotary mowers enabling operators to cover more acreage in less time, resulting in less labor costs. If the size of the mower is increased to compensate the cost of owning and operating the necessary tractor goes up considerably. Additionally, mowing must be repeated to be effective multiplying the total cost per acre for weed control.

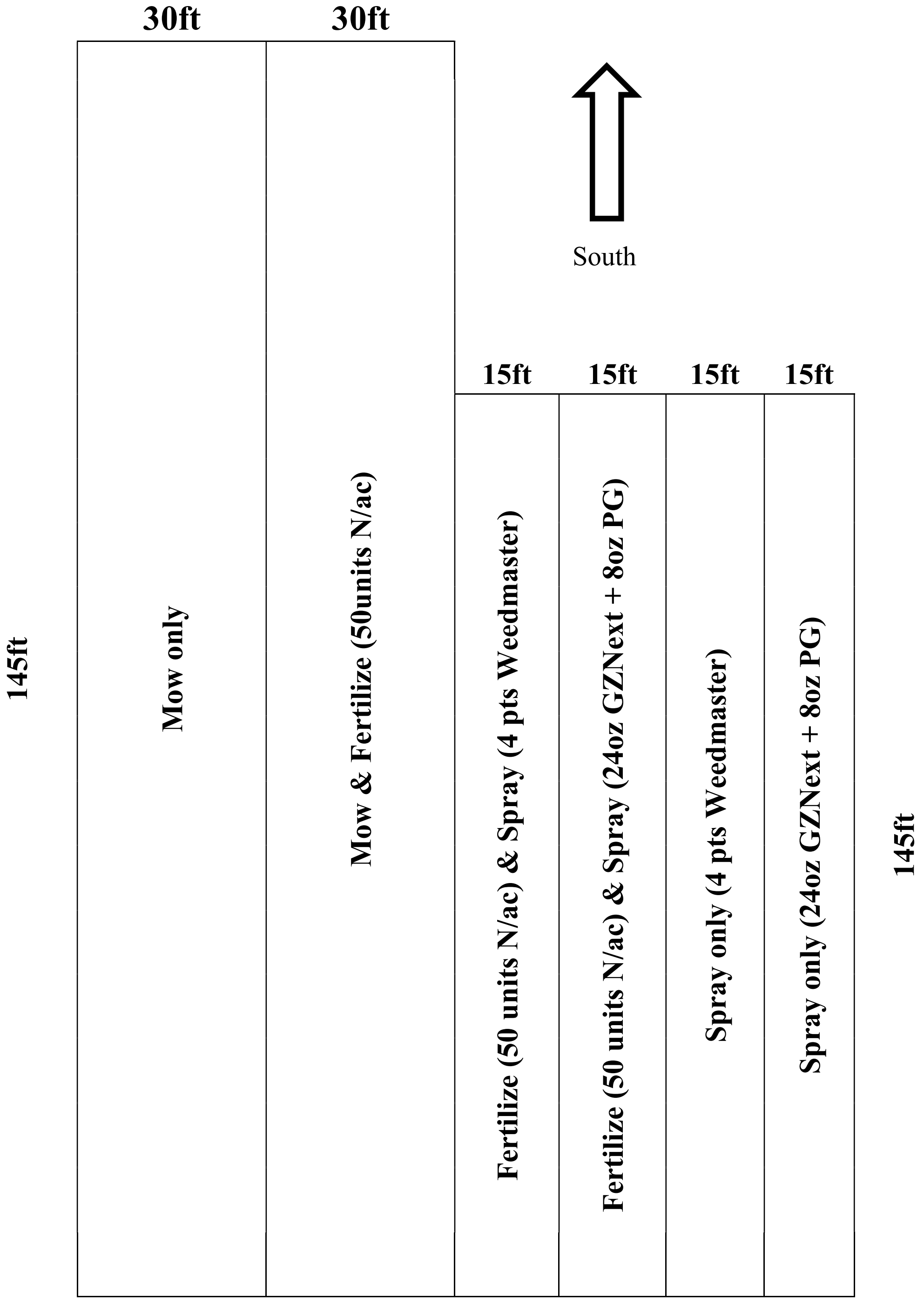
Your county's UF/IFAS Agricultural Extension Agent is available to assist you with any topics discussed in these proceeding. When managing weeds on your operation be sure to consider each component of the entire system and how you can maximize the efficiency of each to help achieve maximum economic returns.

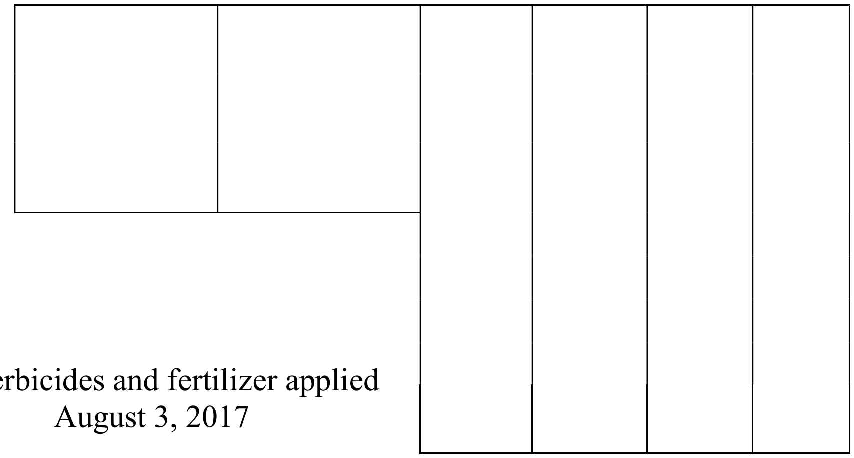
2017 NFREC Beef & Forage Field Day Weed Management Demonstration 1



All products applied July 7, 2017

2017 NFREC Beef & Forage Field Day Weed Management Demonstration 2





All herbicides and fertilizer applied
August 3, 2017

BALANCING HAY DIETS WITH COMMODITIES

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Introduction

As the summer pastures slow down, Florida beef producers begin to prepare for the transition into winter feeding. With the increase in winter annual forages options due to plant breeding efforts and the increased availability of seed, particularly in the Florida panhandle, the decision of whether to graze winter annuals or to feed hay is typically made in the middle of the summer. As it is often stressed by UF/IFAS Extension personnel, not making a decision by late summer in terms of seed purchase or field preparation, could mean that a decision has been made: hay and perhaps some supplement will be the feed resources for the upcoming winter. As it will be discussed in the next section, great differences may exist between hay bales. These differences are not only due to forage type (e.g., bermudagrass vs. bahiagrass) but also to management factors such as fertilization program, timing of cutting, storage, etc.

A tale of two bales

For the purpose of this exercise, the discussion will center on two hay bales, one of Tifton 85 bermudagrass and another of bahiagrass. Both bales were actually produced at NFREC during 2016, and a sample was taken and analyzed for nutritional composition. The results of the analyses are shown below in Table 1. For a more detailed description on how to interpret hay analyses, the reader is encouraged to consult the article: "Understanding your forage test report", published by Doug Mayo in the Panhandle Ag electronic newsletter (http://nwdistrict.ifas.ufl.edu/phag/2014/10/24/understanding-your-forage-test-report/).

For the purpose of these proceedings, a nutrient balancing exercise will be conducted using the two bales described in Table 1 as the basis for the winter feeding program. To simplify calculations, the balancing exercise will concentrate only on energy (expressed as total digestible nutrients or TDN), and crude protein (CP).

Is hay alone sufficient to meet the requirements of a mature cow?

Assuming a body weight of 1,200 lb for a crossbred cow, the first step on a nutrient balancing exercise would be to calculate the nutrient requirement and potential hay intake for the different bales. Based on the Nutrient Requirements of Beef Cattle published by the National Academies of Science Engineering and Medicine (NASEM, 2016), a 1,200 lb cow in the last trimester of pregnancy would be required to consume 11.8 lb of TDN and 1.7 lb of CP daily to maintain her body weight and support the growing fetus. Hay intake is an important factor in these calculations.

Using data compiled in several studies conducted at NFREC where hay was offered free choice, the amount of hay consumed per day for the purpose of this exercise was estimated at 1.7% of BW. For more details about the studies referenced here to determine hay intake, the reader is encouraged to consult the review by DiLorenzo et al. (2017) published in the proceedings of the Florida Beef Cattle Short Course (see link to proceedings in the references section). Thus, a 1,200 lb cow will be consuming daily 20.4 lb of hay dry matter. This translates into and intake of 10.8 lb and 11.4 lb of TDN per day for the bahiagrass and T85 bermudagrass bales, respectively. In terms of protein, the bahiagrass hay will provide an intake of 1.7 lb/d, while the T85 bermudagrass will provide 2.7 lb/d.

Table 1. Nutrient analyses of two hay bales produced at NFREC.

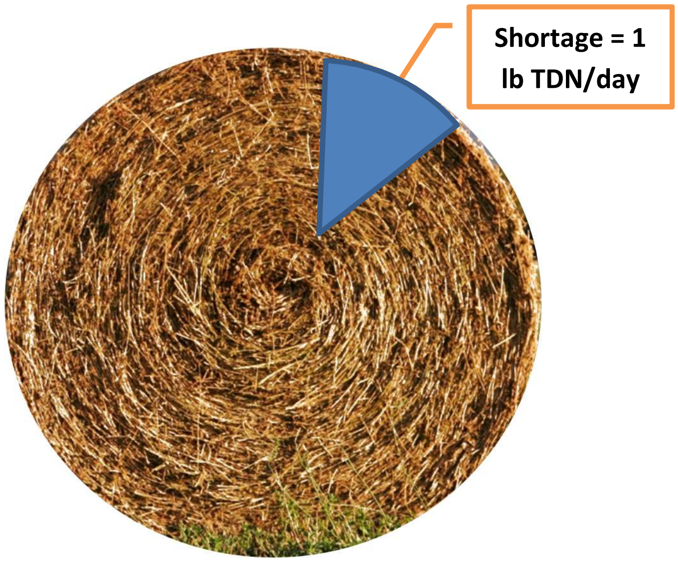
	Hay type	
Item (all in DM basis)	**Bahiagrass**	**T85 Bermudagrass**
Moisture, %	9.9	8.8
Dry matter, %	90.1	91.2
Crude protein,%	8.1	13.0
ADF, %	42.2	40.6
NDF, %	75.7	71.5
TDN, %	53	56
Ca, %	0.47	0.41
P, %	0.23	0.29
S, %	0.22	0.49

Using the two bales from Table 1 as the basis for winter feeding, it can be observed that both are sufficient to meet the protein requirements of a late pregnant cow. However, neither hay is able to meet the requirements of TDN (energy). Even though the T85 bermudagrass hay comes close to meeting the energy requirements, it is still 0.4 lb of TDN per day short, which in the long term can lead to a substantial loss in body condition score at calving, and compromise the subsequent lactation and potential calf growth. Figure 1 shows the TDN shortage that will need to be supplemented daily from other sources, such as commodities and grain byproducts. The amount of each byproducts needed to meet this shortage will depend largely on the energy concentration (i.e., TDN) of each feed resource.

Why use late gestation? The differences will be even more dramatic during peak lactation.

Fig. 1. Proportion of the TDN requirements of a 1,200 lb pregnant cow met when fed ad libitum amounts of either Tifton 85 bermudagrass hay or bahiagrass hay. The hay analyses are described in Table 1.

Tifton 85 bermudagrass hay



Bahiagrass hay

Supplemental feed needs for a 25-herd (or multiples of it)

In order to provide some practical guidelines for supplementation, this exercise will use a hypothetical herd of 25 head of 1,200 cows in late gestation to calculate the needs of supplement in order to meet their requirements on a weekly basis. Reasons to use these assumptions have to do with the practicality of multiplying the amounts calculated in order to calculate feed purchase needs for each individual scenario. Table 2 was constructed using the most cost effective feedstuffs typically found in Florida in order to provide a guideline for nutrient balancing based on, in this particular case, a shortage of TDN.

Table 2. Amount of supplemental feed from each commodity or byproduct, needed each week (in lbs) in order to meet the requirements of a 25-head herd of 1,200 mature cows in late gestation, when fed either bahiagrass or T85 bermudagrass with the quality described in Table 1.

	Type of hay	
Feedstuff used to balance	**Bahiagrass**	**T85 Bermudagrass**
Soybean hulls	227 lb	91 lb
Corn gluten feed	219 lb	88 lb
Distillers grains	177 lb	71 lb
Molasses	236 lb	95 lb
Cottonseed meal[1]	227 lb	91 lb

[1]Protein will be greatly in excess when using cottonseed meal to balance for TDN.

The main decision on which commodity to use for balancing for energy in this exercise should be based on cost and management practices, such as labor available for feeding. Table 3 is provided as a reference with current prices (as of September 2, 2017) to determine the weekly cost of feed purchase only that would be incurred to balance the energy needs in the 25-head cowherd in this exercise.

Table 3. Weekly cost (feed purchase only) of supplemental feed from each commodity or byproduct, in order to meet the requirements of a 25-head herd of 1,200 mature cows in late gestation, when fed either bahiagrass or T85 bermudagrass with the quality described in Table 1.

	Type of hay	
Feedstuff used to balance ($/ton)	**Bahiagrass**	**T85 Bermudagrass**
Soybean hulls ($170/ton)	$19	$8
Corn gluten feed ($160/ton)	$18	$7
Distillers grains ($160/ton)	$14	$6
Molasses ($140/ton)	$17	$7
Cottonseed meal[1] ($280/ton)	$32	$13

Take Home Message

The quality of hay has a great impact on the overall economics of the operation. The main way in which hay quality affects the bottom line of the operation is related to the extra costs that may be incurred when attempting to balance nutrient in a low-quality hay-based diet. This exercise was attempted as a guideline to provide some cost analyses for typical situations of balancing a hay-based diet intended for a gestating mature cow. When reviewing the figures presented here, three main variables should be carefully considered: Variable #1) the nutrient analysis of the hay used: In this case, the nutritional value of the hay used may be above average because of the fertilizing program followed at NFREC. Variable # 2) the hay intake level: For this exercise was set at 1.7% of the cow's BW based on previous research, but it can be as low as 1.4% of the BW in poor quality forages. Finally, variable # 3) the nutrient requirements of the cow: The requirements increase greatly after calving, peaking at 2 to 3 months of lactation. This increase in nutrient demand during lactation needs to be carefully considered if a hay-based diet is to be balanced for a lactating cow.

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Cracking the Bull Buying Code

Kalyn Waters

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Introduction

Attending a bull sale, with the intent to purchase a bull, not just for the free meal, is a stressful day for most cattle producers. One of the single greatest factor impacting the future of your beef cattle operation, both sort and long term, is the bulls you will purchase to be used as herd sires for your operation. Purchasing bulls should be a strategic balance between phenotypic (physical traits) and genotypic (genetic potential) traits. Performance is a function of genetics and management. The great news is that as cattle producers you have complete control of both genetics and management!

By breaking the bull buying process down into three steps, you can effectively prepare for the bull buying season.

1) Identify the genetic priorities of your operation
2) Establish benchmarks
3) Do your homework

Identify the genetic priorities of your operation

- *How do you market your calf crop?*
    - Retain ownership vs. market at weaning: if you retain ownership you will want to make sure that you are focusing on not only pre-weaning traits, but also looking at traits that will impact how those calves will perform in the feed yard and on the rail, post-harvest.
- *Will replacement heifers be retained?*
    - Purebred vs Crossbred options: if you are retaining your own replacement heifers, you will need to have a purebred option to allow you to maintain the genetics of your herd, whereas if you do not, selecting a terminal cross sire, without focusing on the maternal traits of his offspring is an option.
- *Will this bull be used on heifers, cows, or both?*
    - Growth vs. Calving Ease
- What environmental factors need to be taken into account?
    - Tropical environment may need percentage influence of *Bos Indicus*
- What are the strengths and weaknesses of your cow herd?
    - Example: mature cow size, weaning weight, fertility, calving ease, growth, temperament

Establish Benchmarks

Once you have established the goals for your herd you can establish benchmarks for which you will be selecting bulls.

Examples of benchmark traits might be birth weight (BW) and calving ease direct (CED) if you are selecting heifer bulls. Others would include minimum weaning weight, carcass traits, and some indexs that are available for breeds such as Beef Value ($B) from the Angus Association.
A very helpful tool for benchmarking bulls prior to the sale is to look at the percenage ranking within each breed. For example, it is a good rule of thumb to be in the top 25% for breed average in BW and CED when selecting heifer bulls. In addtion, when selecting heifer bulls, you need to take into account crossbreeding and its potenial to impact calving ease.
If are you selecting across breeds, for example at a sale that offeres Sim-Angus and Angus bulls, it is important to take into acount across breed difference in EPD's. The table at the conclusion of these proceedings provides the across breed adustments from MARC.
It is important to set these benchmarks for selection based off of your genetic goals for your operation. Benchmarks can be as simple as hip height and color.

Do Your Homework

By the time you arrive at the sale, you should already have a solid idea of which handful of bulls you are interested in buying. If you are located in close proximite to the sale, it is also a great idea to go and evaluate the bulls in person, prior to the sale. This will give you the opportunity to look at the bulls in a more natural setting, instead of in the sale day setting. This is where you will determine if phenotypic traits complement the EPD's of the bulls.

By the time you arrive at the sale, you should have evaluated each of the bulls that meet your benchmarks and follow the genetic strategy of your operation. In addtion, it is good practice to set a value for each bull you are considering purchasing. Based off of a bulls abblity to meet the needs of your operation, and the genetic improvement he can bring to you herd, you can build your budget for each bull. If you know going into the sale, based off of the homework you have done, what you are willing to pay for each bull, your sale day will be much more enjoyable. Showing up at the sale 20 minutes before it kicks off, grabing a free lunch, and flipping through the catalog as the bulls come through the ring is not a viable opption for a progressive cattle producer!

MARC Adjustment Factors to Estimate across-breed EPDs

Breed	BW	WW	YW	Milk	MARB	REA	Fat
Angus	0	0	0	0	0	0	0
Hereford	2.3	-7.8	-28.6	-17.3	-0.31	-0.1	-0.06
Red Angus	2.5	-31.4	-34.6	3.3	-0.27	0	-0.02
Shorthorn	4.7	-36.6	-17.3	4.1	-0.14	0.4	-0.11
South Devon	3.3	-11.4	-27.1	3.9	-0.08	0.3	-0.13
Beefmaster	4.7	17.9	0.5	5.9			
Brahman	10.3	45.1	6.6	23.8	-0.78	-0.1	-0.15
Brangus	3.3	12	4	6.3			
Santa Gertrudis	5.7	36.3	43	17	-0.54	-0.1	-0.08
Braunvieh	1.9	-25.5	-50	-0.8	-0.7	0.8	-0.09
Charolais	8	34.6	40.4	8.2	-0.33	1	-0.21
Chiangus	3.2	-27	-40.5	-1.7	-0.34	0.3	-0.09
Gelbvieh	2.8	-22.6	-29.3	2.3	-0.27	0.8	
Limousin	2.3	-18.2	-41.3	-13.7	-0.43	1	-0.13
Maine Anjou	4.2	-30.5	-38.7	-6.2	-0.57	1	-0.19
Salers	1.8	-7.3	-25.7	5.9	-0.09	0.9	-0.2
Simmental	3.2	-9.4	-12.1	4.4	-0.34	0.5	-0.13
Tarentaise	3.4	25.1	5.6	24.2			

Adopted From 2016 BIF Proceedings, Manhattan, KS

MARC adjustment factors that can be added to the EPDs of animals of different breeds, adjusting their EPD values to an Angus equivalent. The adjustment factors, given relative to an Angus equivalent of zero for each trait, take into account breed differences measured in the Germplasm Evaluation Project at MARC, as well as differences in breed average EPDs and base year. Animals of various breeds can be compared on the same EPD scale, after adding the specific adjustment factor to EPDs produced in the most recent genetic evaluations of the representative breeds. Use of these factors does not change differences in EPDs among bulls within a breed. However, it does affect differences among bulls of different breeds.

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Carcass merit of current US fed beef offering

Dr. Chad Carr

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The first National Beef Quality Audit (NBQA) was conducted in 1991 to create a nationwide snapshot of the status of the beef industry. After completing the first NBQA, the executive summary suggested it should be repeated periodically to understand what changes had occurred and what areas still require industry focus. Over the last 25 years, 5 NBQAs have been conducted: 1991, 1995, 2000, 2005, 2011, and 2016.

An all-inclusive compilation of the 2016 NBQA (both for fed steers and heifers and cows and bulls) is available on this Texas A&M website. http://meat.tamu.edu/research/quality-audit-resources/

The report from the in-plant data collected for trucking, live, offal, and slaughter floor carcass defects of fed cattle are linked here. The most important finding of this component of the NBQA was the increase in value lost of offal condemnations. Specifically, the level of condemned livers in 2016 was markedly higher than previous audits which increases lost opportunities, as documented in this producer-focused, Beef Quality Assurance summary of the 2016 NBQA.

All live animal data and carcass quality defect data (blood splash, dark-cutters, advanced maturity) has and will continue to be collected by researchers in the plant. However, the 2011 and 2016 NBQA included beef carcass grade data collected from instrumentation which assessed over 2.4 and 4.5 million carcasses, respectively as documented in this manuscript .

The screenshot of Table 1 shows the comparison of the instrument-graded as well as in-plant data collection (n = 9,106). This comparison suggests that the 2016 in-plant data is indicative of the real population average.

Table 1. National Beef Quality Audit – 2016: Means for USDA carcass grade traits between the in-plant survey and instrument data

Trait	In-plant survey[1] (*n* = 9,106)	Instrument data (*n* = 4,544,635)
USDA yield grade	3.1	3.1
Fat thickness, cm	1.4	1.37
HCW, kg	390.3	393.6
LM area, cm^2	89.5	88.9
KPH, %	1.9	2.1
Marbling score[2]	470	475

[1]Boykin et al. (2017).

[2]100 = Practically devoid^{00}; 300 = Slight^{00}; 400 = Small^{00}; 500 = Modest^{00}; 700 = Slightly Abundant^{00}; 900 = Abundant^{00} (USDA, 2016).

Table 2. National Beef Quality Audit–2016: Means, SD, and minimum and maximum values for USDA carcass grade traits

Trait	*n*	Mean	SD	Minimum	Maximum
USDA yield grade	7,379	3.1	1.0	−0.7	9.3
USDA quality grade[1]	8,651	696	110	367	890
Adjusted fat thickness, cm	7,992	1.42	0.71	0.0	6.35
HCW, kg	8,493	390.3	46.5	195.9	616.4
LM area, cm^2	8,681	89.5	11.2	45.8	141.9
KPH, %	8,531	1.9	1.1	0	6.0
Marbling score[2]	8,660	470	104	200	970
Lean maturity[3]	8,741	155	24	110	490
Skeletal maturity[3]	8,061	169	34	110	480
Overall maturity[3]	8,730	164	27	115	445

[1]100 = Canner^{00}; 400 = Commercial^{00}; 600 = Select^{00}; 700 = Choice^{00}; 800 = Prime^{00} (USDA, 2016).

[2]100 = Practically devoid^{00}; 200 = Traces^{00}; 300 = Slight^{00}; 400 = Small^{00}; 500 = Modest^{00}; 700 = Slightly Abundant^{00}; 900 = Abundant^{00} (USDA, 2016).

[3]100 = A^{00}; 200 = B^{00}; 300 = C^{00}; 400 = D^{00}; 500 = E^{00} (USDA, 2016).

National Beef Quality Audit – 2016 2995

Table 3. National Beef Quality Audit (NBQA): Means for USDA carcass grade traits from NBQA–1991, NBQA–1995, NBQA–2000, NBQA–2005, NBQA–2011, and NBQA–2016[1]

Trait	NBQA–1991 ($n = 7{,}375$)	NBQA–1995 ($n = 11{,}799$)	NBQA–2000 ($n = 9{,}396$)	NBQA–2005 ($n = 9{,}475$)	NBQA–2011 ($n = 9{,}802$)	NBQA–2016 ($n = 9{,}106$)
USDA yield grade	3.2	2.8	3.0	2.9	2.9	3.1
USDA quality grade[2]	686	679	685	690	693	696
Adjusted fat thickness, cm	1.5	1.2	1.2	1.3	1.3	1.4
HCW, kg	345.0	339.2	356.9	359.9	374.0	390.3
LM area, cm^2	83.4	82.6	84.5	86.4	88.8	89.5
KPH, %	2.2	2.1	2.4	2.3	2.3	1.9
Marbling score[3]	424	406	423	432	440	470
Lean maturity[4]	163	154	165	157	154	155
Skeletal maturity[4]	175	163	167	168	162	169
Overall maturity[4]	169	160	166	164	159	164

[1]NBQA–1991 (Lorenzen et al., 1993); NBQA–1995 (Boleman et al., 1998); NBQA–2000 (McKenna et al., 2002); NBQA–2005 (Garcia et al., 2008); NBQA–2011 (Moore et al., 2012).

[2]100 = Canner^{00}; 400 = Commercial^{00}; 600 = Select^{00}; 700 = Choice^{00}; 800 = Prime^{00} (USDA, 2016).

[3]100 = Practically devoid^{00}; 300 = Slight^{00}; 400 = Small^{00}; 500 = Modest^{00}; 700 = Slightly Abundant^{00}; 900 = Abundant^{00} (USDA, 2016).

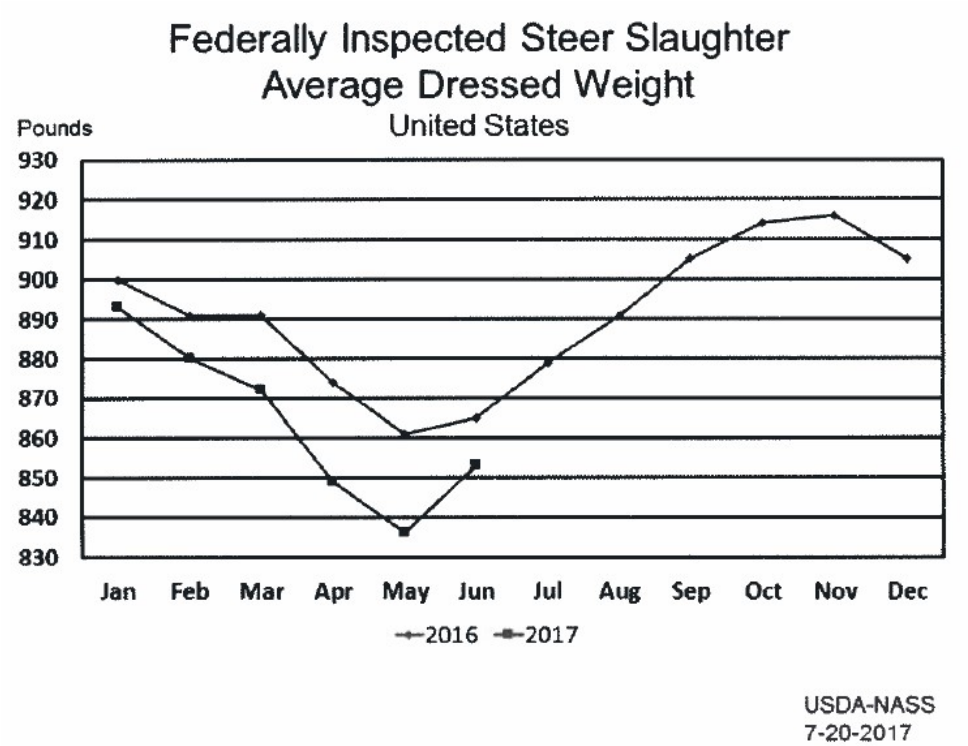
[4]100 = A^{00}; 200 = B^{00} (USDA, 2016).

The means, ranges, and standard deviations (SD) for the 2016 NBQA are shown above in the screenshot of Table 2. Additionally, the means for major carcass traits across the 6 reported NBQAs are depicted in the above screenshot of Table 3.

In 2005, hot carcass weight (HCW) was ≈ 360 kg which = 792 lbs. Average HCW in 2016 was ≈ 859 lbs. To give perspective to how overwhelming a change that is, the SD of HCW for the 2016 NBQA was 102 lbs. Therefore, from 2005 to 2016, HCW increased 66 % of a SD.

In 2005, the average marbling score was ≈ Small 42, which increased by approximately 28 units to Small 70 in 2016. Considering the SD of 104 units, the mean for marbling has increased 27 % of a SD in 11 years. After adjusting for carcass maturity, the average quality grade increased from Select 90 in 2005, to Select 96 in 2016. Using the SD of 110 units from the 2016 NBQA, USDA quality grade only increased 5 % of a SD in 11 years. Marbling has certainly increased, but not as much as tonnage.

Also, the below results from USDA would suggest that HCW is ≈ 10 lbs lighter in 2017 than in 2016. This is possibly due to a greater number of cattle on feed in 2017 compared to 2016, potentially alleviating the need to feed calves to such heavy weights.



Though the real average for marbling, has probably not moved the needle that far, the frequency of improved quality grades has increased. The following frequency data are not reported in a table. In the 2016 NBQA, the frequency of USDA QG was 3.8% Prime, 67.3% Choice, 23.2% Select, and 5.6% other. The "other" category included Standard, Commercial, Utility, dark cutter, blood splash, hard bone, and calloused eye. The NBQA–2011 frequency of USDA QG was 2.1% Prime, 58.9% Choice, 32.6% Select, 5.1% Standard, 0.9% Commercial, and 0.3% Utility. These data show we have probably doubled the percentage of Prime (+1.7% points) and certainly increased Choice (+8.4% points) carcasses along with a concomitant decrease in the frequency of Select (−9.4% points) carcasses since 2011. These numbers seem to be consistent with USDA AMS grading percentages reported below.

An interesting fact is that although the percentage of Prime carcasses has approximately doubled, the price cwt of Prime beef has also increased as shown by this article. This certainly is working against market dynamics of supply and demand. When this proceeding was printed on Aug 31, the Choice/Select spread was $2 cwt, yet the Prime premium over low Choice was $16 cwt.

NW_LS196
Des Moines, Iowa   Mon Aug 21, 2017   USDA Market News

USDA NATIONAL STEER & HEIFER ESTIMATED GRADING PERCENT REPORT
For Week Ending: 8/11/2017

National, Regional, and State Breakdown of Official USDA Quality Grades.
Percentages derived from each category numerical total, divided by the total
number offered for USDA quality grading in each corresponding area.

	National	Region 1-5	Region 6	Region 7-8	Region 9-10
Prime	5.59%	12.98%	2.43%	5.15%	7.95%
Choice	73.84%	71.99%	64.27%	76.72%	71.15%
Select	16.96%	10.83%	29.10%	14.77%	16.96%
Other	3.61%	4.20%	4.20%	3.36%	3.94%

	Nebraska	Kansas	Texas
Prime	4.83%	4.87%	2.43%
Choice	77.28%	77.96%	64.27%
Select	13.90%	14.54%	29.10%
Other	3.99%	2.62%	4.20%

National USDA Certified Beef Program Information

Percentage of the Choice Grade USDA Certified in the Upper 2/3rd:	31.19%
Percentage of cattle offered under Schedule GLA identified:	71.08%

The above screenshot addresses the only component of the 2016 NBQA which suggests it was not that representative of the current population of fed cattle. The below screenshot of Table 4 suggests that the % black hided decreased from 61 to 58 % and that the % Holstein almost quadrupled to over 20 %. The 2017 USDA data above reports 71 % of fed cattle as GLA, the USDA acronym for "Angus". These percentages have only increased year-over-year for 15 years.

Table 4. National Beef Quality Audit (NBQA): Percentages of hide-on carcasses with predominant hide color or breed type evaluated in NBQA-2000, NBQA-2005, NBQA-2011, and NBQA-2016[1,2]

Item	NBQA-2000	NBQA-2005	NBQA-2011	NBQA-2016 (± SEM)
Black	45.1	56.3	61.1	57.8 ± 0.3
Holstein (black and white)	5.7	7.9	5.5	20.4 ± 0.3
Red	31.0	18.6	12.8	10.5 ± 0.2
Yellow	8.0	4.9	8.7	4.8 ± 0.1
Gray	4.0	6.0	5.0	2.9 ± 0.1
Brown	1.7	3.0	5.0	1.3 ± 0.1
White	3.2	2.3	1.4	1.1 ± 0.1

[1]Total number of observations for hide color were: 43,415 (NBQA-2000); 49,330 (NBQA-2005); 15,143 (NBQA-2011); 24,672 (NBQA-2016).
[2]NBQA-2000 (McKenna et al., 2002); NBQA-2005 (Garcia et al., 2008); NBQA-2011 (McKeith et al., 2012).

The final and maybe most interesting parameter from the 2016 NBQA to consider is the HCW distribution shown in the screenshot of Table 5. This table accounts for 7,379 carcasses. Look at the heaviest column on the far right. A 500 kg = 1,100 lbs. In this audit, 72 of 7,379 carcasses or 1 % of the in-plant audit weighed over 1,100 lbs. The average HCW for that column is 518 kg = 1,139 lbs. Using an estimated average dressing percentage of 63 %, that associates with an 1,809 lb market steer! The US slaughters approximately 100,000 fed cattle each day. This snapshot would suggest that close to 1,000 1,800 lb steers are slaughtered daily. As discussed earlier, USDA reports suggest that weights have decreased slightly in 2017, but the take home of the 2016 audit is beef cattle and their carcasses are big.

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Table 5. National Beef Quality Audit–2016: Least squares means for carcass traits (SEM) within carcass weight groups

	Carcass weight group, kg						
Trait	<272.6 (n = 45)	272.7 to 318.1 (n = 379)	318.2 to 363.5 (n = 1,715)	363.6 to 409.0 (n = 2,864)	409.1 to 454.4 (n = 1,852)	454.5 to 500 (n = 452)	>500 (n = 72)
USDA yield grade	2.2^{g}	2.5^{f}	2.8^{e}	3.1^{d}	3.4^{c}	3.7^{b}	4.3^{a}
	(0.17)	(0.04)	(0.02)	(0.02)	(0.02)	(0.04)	(0.12)
USDA quality grade[1]	666^{d}	688^{c}	703^{b}	710^{a}	708^{a}	706^{ab}	711^{ab}
	(7.5)	(3.4)	(1.7)	(1.1)	(1.7)	(4.1)	(9.7)
Adjusted fat thickness, cm	0.9^{f}	1.1^{f}	1.3^{e}	1.4^{d}	1.5^{c}	1.7^{b}	1.9^{a}
	(0.13)	(0.03)	(0.02)	(0.01)	(0.02)	(0.03)	(0.08)
HCW, kg	255.0^{g}	301.7^{f}	344.1^{e}	386.9^{d}	428.4^{c}	469.7^{b}	518.1^{a}
	(2.83)	(0.59)	(0.29)	(0.23)	(0.28)	(0.49)	(2.05)
LM area, cm^2	75.6^{f}	81.1^{e}	85.2^{d}	89.2^{c}	93.0^{b}	97.0^{a}	98.6^{a}
	(1.48)	(0.44)	(0.23)	(0.18)	(0.23)	(0.45)	(1.23)
KPH, %	1.8^{bc}	1.9^{c}	1.9^{bc}	2.0^{b}	2.1^{a}	2.2^{a}	2.1^{ab}
	(0.14)	(0.05)	(0.02)	(0.02)	(0.02)	(0.04)	(0.12)
Marbling score[2]	379^{f}	434^{e}	462^{d}	473^{c}	478^{bc}	486^{b}	519^{a}
	(12.3)	(4.7)	(2.4)	(1.8)	(2.3)	(4.4)	(11.9)
Lean maturity[3]	154^{abc}	156^{a}	154^{b}	153^{c}	152^{d}	151^{d}	153^{bcd}
	(2.1)	(1.0)	(0.4)	(0.3)	(0.3)	(0.6)	(1.8)
Skeletal maturity[3]	159^{e}	165de	167de	167^{d}	169^{c}	174^{b}	188^{a}
	(2.6)	(1.4)	(0.6)	(0.5)	(0.7)	(1.6)	(5.5)
Overall maturity[3]	157^{c}	161^{c}	161^{c}	161^{c}	162^{c}	165^{b}	174^{a}
	(2.1)	(1.0)	(0.5)	(0.4)	(0.5)	(1.2)	(3.9)

$^{a–g}$Means within a row with different superscripts differ ($P < 0.05$).

[1]100 = Canner^{00}; 400 = Commercial^{00}; 600 = Select^{00}; 700 = Choice^{00}; 800 = Prime^{00} (USDA, 2016).

[2]100 = Practically devoid^{00}; 300 = Slight^{00}; 400 = Small^{00}; 500 = Modest^{00}; 700 = Slightly Abundant^{00}; 900 = Abundant^{00} (USDA, 2016).

[3]100 = A^{00}; 200 = B^{00} (USDA, 2016).

There has been some increase in the percentages of USDA Choice and especially Prime carcasses, but the differences are not as consequential as the increase in tonnage.

Citations

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