2020 Northeast Pasture Consortium Conference Proceedings
January 15-16, Lake Morey Resort, 82 Clubhouse Road, Fairlee, VT

Eighty people attended and participated in the Northeast Pasture Consortium (NEPC) Conference held at Lake Morey Resort in Fairlee, Vermont. This was our best turnout since 2017. This was helped by a Cedar Tree grant received by the University of Vermont that was used to bring collaborators of that grazing lands project together to attend this conference and financial support from USDA-Agriculture Research Service. The federal budget was passed and signed into law just before Christmas 2019 so this allowed the highest attendance of grazing lands specialists from USDA-Natural Resources Conservation Service in some years. Several of them used this occasion to meet immediately after the Conference to discuss several pressing grazing lands issues. Our Conference was also providentially sited and timed to avoid any big winter storms for a change by adjourning two days ahead of a major snowstorm that swept across the Northeast.

Our Conference covered many of the research and education priorities that our stakeholders have asked us to work on. It also featured a first time session on pasturing pigs which is gaining in popularity around the Northeast. They are small herds, usually being an added livestock enterprise to diversify the pasture produced products being offered by the farm. This was followed-up by the Vermont Grazing and Livestock Conference that convened on January 17 at the same venue with a farmer group discussion session on pasturing pigs on the morning of January 17. Eleven continuing education units (CEUs) were approved for Certified Crop Advisers and Certified Forage and Grassland Professionals by ASA-CSSA-SSSA and the American Forage and Grassland Council, respectively for our Conference technical sessions.

The conference was opened by Executive Director, Jim Cropper at 8:00 AM Wednesday, January 15. He gave a brief introduction of the Conference and told the audience that he would be passing out sign-in and -out sheets for Certified Crop Advisor CEUs and at the end of the technical sessions on January 16 at 10:00 AM the signup sheet for Certified Forage and Grassland Professionals. Due to the large attendance, we skipped our usual round of introductions of all those in attendance, but Jim introduced all the members of the Executive Committee. Then, Jessica Williamson of the Executive Committee and Penn State Extension Forage Specialist, asked for a show of hands from the audience on what group they represented: USDA-ARS, Extension, USDA-NRCS, farmers, University researchers, agri-business, and nongovernmental organizations. We were particularly heartened by the number of farmers attending. Sid Bosworth, Principal Investigator for the Northeast Pasture Consortium (NEPC) project, then introduced and handed out a *Future of the NEPC* questionnaire for everyone in attendance to fill-out and return to the registration desk.

Session 1 - The Fescues – Soft-leaved and Meadow

This technical session began at 8:30 AM. **Jessica Williamson** moderated this session and was the first speaker. She presented "Tall Fescue: Effects on your Operation and Managing your Pastures". It is a cool-season grass that covers an estimated 40 million acres of pasture and hayland in the US. It is said that due to the presence of a toxic alkaloid in endophyte-infected tall fescue, it causes the second largest annual economic loss to the cattle industry in the US. It is adapted to nearly all of the Northeast except for northern Maine. It is the main pasture forage grass in the Mid-South of the US as the endophyte fungus that produces the alkaloid makes the grass heat

and humidity tolerant. It is the only cool-season grass that does well in this part of the Nation and supports a large cow-calf beef industry in the Mid-South. It may cause livestock health problems and reduce average daily gain (ADG), but the cow-calf industry here might not even exist if were not for endophyte-infected tall fescue (E+).

Tall fescue at full vegetative height

The endophyte fungus in tall fescue has the scientific name, *Neotyphodium coenophialum*. It has a symbiotic association with tall fescue. When looked at under a high powered microscope, the fungus appears as very thin threads coursing through its leaves between plant cells. It produces an ergot alkaloid called ergovaline which is toxic to animals grazing infected tall fescue. Yet, ergovaline has a positive effect on the host fescue. It makes it more winter hardy, drought resistant, heat tolerant, and better adapted to poorly drained soils. In other words, it can grow just about anywhere it is planted. It is also produces more forage than most other common pasture cool-season grasses.

The ergovaline gets eventually concentrated in the seedhead of tall fescue. It causes vasoconstriction that shrinks the blood vessels especially restricting blood flow to peripheral body parts in livestock grazing tall fescue where the blood vessels are smaller in diameter than elsewhere in the body. As a result, there can be sloughing of hooves, ears, and loss of tail switches. Fescue toxicosis also causes abortions and dystocia (difficulty calving), fat necrosis around intestines, and agalactia (lack of colostrum and milk production).

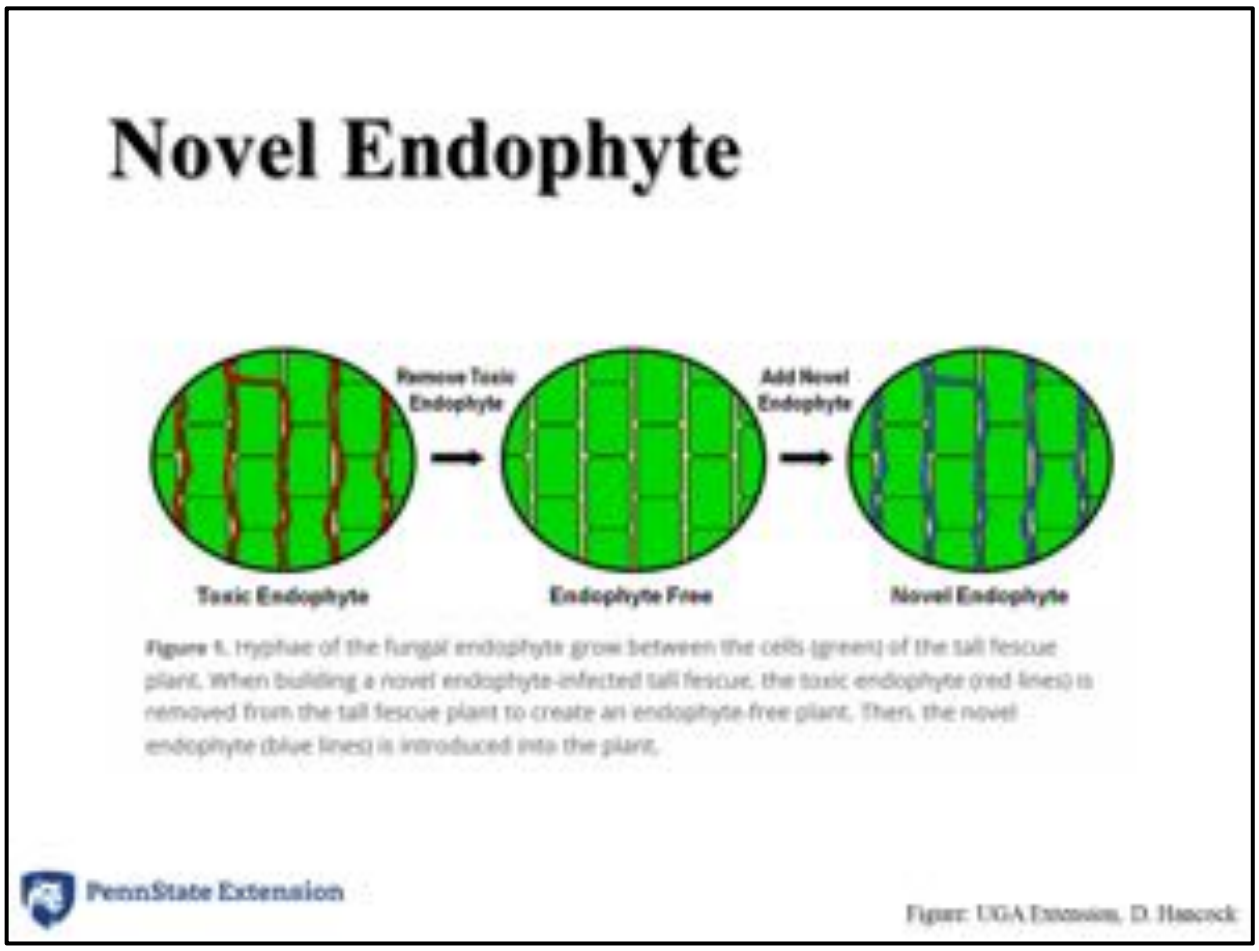
Angus steer with low grade fever standing in water to cool off. Often times cattle will wallow in mud to cool down.

Symptoms of fescue toxicosis are retention of winter hair coats into warm weather, increased body temperatures, labored breathing, and decreased animal performance (lower ADG, reproductive efficiency, and milk production).

Table 1. †Summary of the effect of E+ tall fescue on cattle. Data derived from multiple research trials where pastures contained 70% or more E+ tall fescue.

Performance Metric	Effect on Production	
Pregnancy rates	Decreased	15-40%
Milk production	Decreased	25%
Weaning weights	Decreased	65- 85lbs
Time spent grazing	Decreased	20%
Forage intake	Decreased	25-40%
Average daily gain	Decreased	0.3-1.2 lbs/day
Water usage	Increased	25%
Body temperature	Increased	1-4°F

†Paterson et.al, 1995



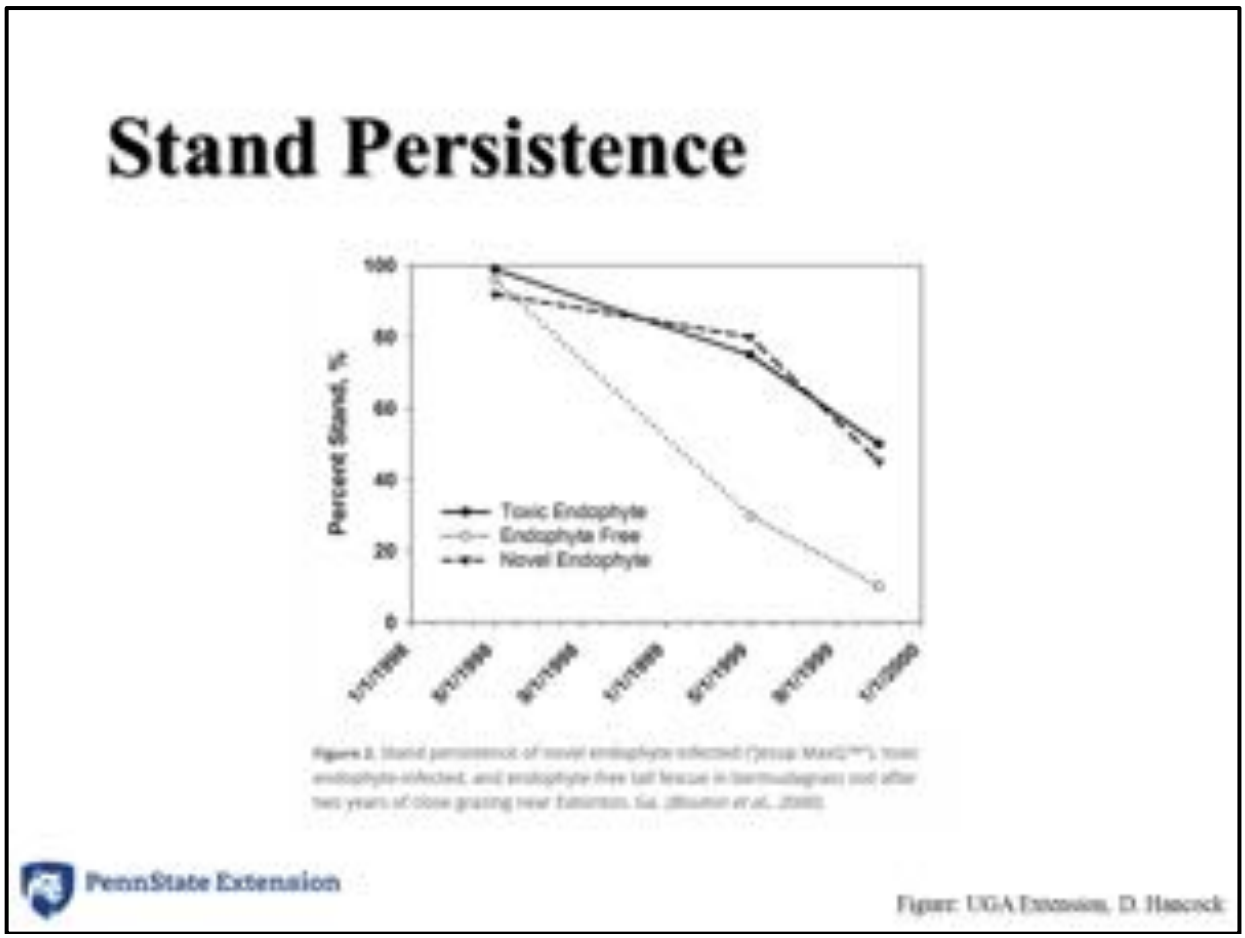
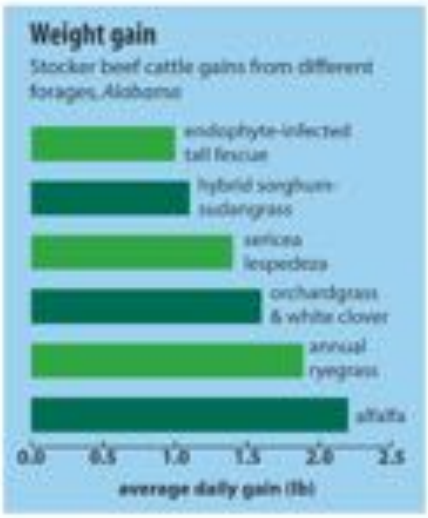


Figure: UGA Extension, D. Hancock

Endophyte-free tall fescue (E-) varieties were produced in mid-twentieth century. Unfortunately, this resulted in a nonpersistent tall fescue. As shown above, when interplanted into a bermudagrass sod, the E- tall fescue virtually disappeared in two years. E+ tall fescue (toxic) and the novel endophyte were equal in survivability growing in a bermudagrass sod. (Editor's Note: They actually would fare much better if not in a bermudagrass sod as bermudagrass being a warm-season grass and growing in Georgia is too competitive to cool-season grasses. They are at war with each other in North Carolina. When left to their own devices, bermudagrass wins out on south and west aspect slopes while tall fescue wins on east and north-facing slopes in naturalized permanent pastures. This is due to differences in soil surface temperatures, warmer on southern and western exposures and cooler on northern and eastern exposures. The higher temperature on the warmer slopes will also cause a greater loss of soil water there than on the cooler slopes.)

Part of the reason for lower ADG on E+ tall fescue is due to the ergovaline as rumen intake of the ruminant decreases as rate of passage is slower through the digestive tract than with other forages (See following graph) or E- and novel endophyte tall fescue. Rumen fill occurs sooner. Steers at weaning weighed sixty pounds more when grazing novel endophyte versus E+ tall fescue in a Georgia study. Heifers were about fifty pounds heavier at weaning coming off of novel endophyte tall fescue. E+ tall fescue stockers were nearly 100 pounds lighter entering a feedlot than stockers coming off of E- and novel endophyte pastures. They remained 100 pounds lighter after 120 days.

Animal Performance



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Ball et al., 2001. Understanding Forage Quality

Animal Performance

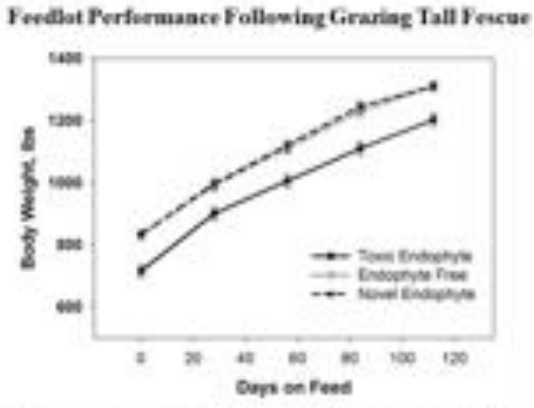

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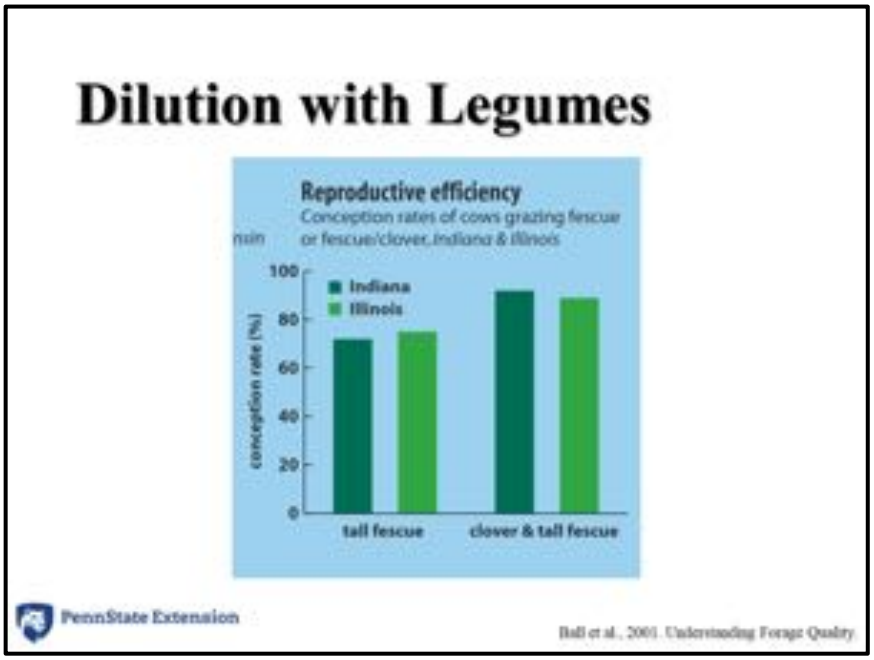
Figure: UGA Extension, D. Hancock

The adjacent table shows a variety of options to reduce the incidence of fescue toxicosis. Rotational grazing and mowing can help reduce ergot alkaloid concentrations in vegetative tillers. They redirect stored carbohydrates for regrowth instead of alkaloid production. Rotational grazing maximizes consumption of leaf blades if livestock are removed before grazing into the leaf sheaths at the base of the plants. Greater concentrations of ergot alkaloids are in the leaf sheaths than in the blades. Leaving a 4-inch stubble height over most of the paddock will avoid much consumption of leaf sheaths. A high stocking density that causes all the tall fescue to be grazed uniformly will suppress seedhead production in the spring and make the regrowth more uniform over each paddock so that spot grazing is not continued over the pasture season (Editor's Note: Livestock favor previously grazed areas over poorly grazed areas that contain dead and less succulent leaves and seed stalks. Spot grazing encourages them to graze previously grazed areas lower than leaf sheath height. This takes a high degree of management and may mean moving them sooner than planned to avoid grazing into leaf sheaths or increasing stock density if not evenly grazed. In the latter situation, leaving them on the currently grazed paddock longer will not work without losing ADG. Once spot grazing is established, they are loath to clean-up the under-grazed areas up as they may be contaminated with fresh urine and dung by that time. They seem to rather want to starve than eat forage that they initially rejected.)

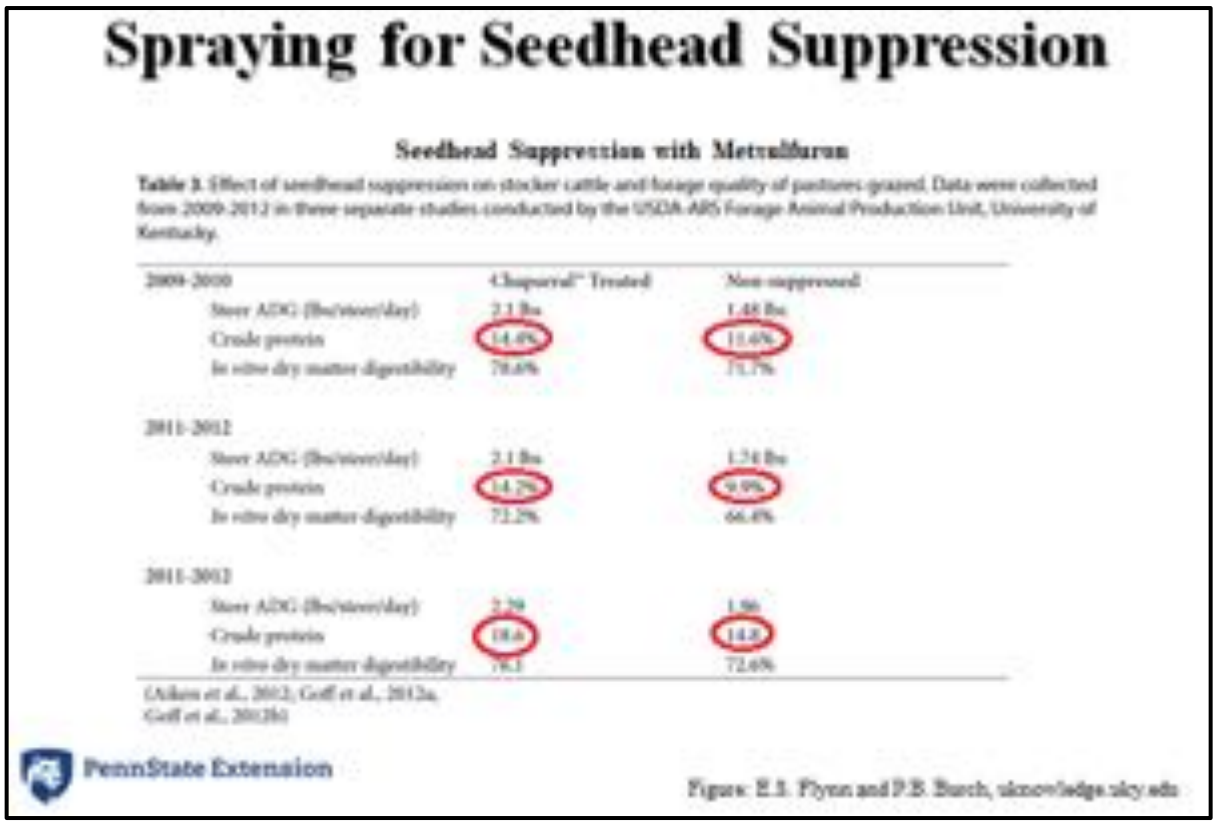
Renovating an E+ tall fescue pasture is a project that takes some thoroughness. The year before, it is ideal not to let the E+ tall fescue go to seed. This means even cleaning out fencelines with an herbicide that kills the fescue before it heads out. The rest of the pasture can be grazed, but not allowed to form any seedheads. Clipping the pasture as needed is justified before seedheads form and throw pollen to be extra sure no viable seed is produced that year. Then, in the fall of the year spray before a hard freeze to kill the tall fescue in the pasture. The following year plant a smother crop such as forage sorghum-sudan cross or other preferred forage annual that will suppress weed and E+ seedling growth. This way the pasture is still available to produce forage for grazing or machine harvest. Before seeding the pasture to a novel endophyte variety, one more contact herbicide spray operation should be done if a few rogue E+ tall fescue plants are still present. A late summer seeding or a next year spring seeding can be done after the clean-up spraying is completed and planting time and re-entry intervals as required are observed. Although this project can be done to minimize loss of the pasture while it is being renovated,

there will be some down time during the process. It is best to do whatever amount you can do yearly over a period of years if it is a goal to eliminate all E+ tall fescue on the farm while not having to cut livestock numbers dramatically. One pasture per year might be the best way to go. It spreads the risk of a seeding failure for one reason or another if done one pasture per year until satisfaction is complete. Only each individual can weigh if renovation will pay for itself in better ADG, milk flow if a dairy farm, or reproductive efficiency for brood mares and other livestock.

Short of complete renovation interseed legumes into E+ tall fescue pastures. The so-called dilution effect of having a strong legume component in the pasture sward has shown to increase reproductive efficiency. With red clover, it recently has been shown that supplementing Biochanin A, a naturally occurring isoflavone in red clover, improved average daily gain (ADG) of grazing beef cattle by 0.2 lbs./day compared to a non-supplemented group (Harlow et al., 2017). Biochanin A is a vasodilator counteracting the effect the ergovaline alkaloid has on constricting blood vessels. It is also hypothesized that Biochanin A modulates the rumen microbial population to increase protein availability (Flythe and Aiken, 2017). It may also potentially alter hormonal balances to favor weight gain due to the estrogenic effects of Biochanin A. Incorporating optimal levels of red clover (30% of total forage mass) into tall fescue pastures could be a management tool for producers to improve ADG efficiency and profitability in pasture-based beef systems.



Protein (pelleted soybean hulls) supplementation of cattle on E+ tall fescue pastures has given an increase in ADG of 0.5 lbs. /day in a research paper by Carter, et al., 2010, Prof. Animal Scientist. Another way to get more protein in the diet goes back to having a good legume component in an E+ tall fescue pasture. On paddocks in the Northeast protein content in grass-only pastures is often already above the needs of the livestock as urine and dung are more evenly distributed over the pastures than in continuously grazed pastures. It is worth taking a forage sample in for a forage analysis before doing purchased protein supplementation. As can be seen in the next graphic, protein content in E+ tall fescue can be dramatically increased just by suppressing seedhead formation.



Spraying for Seedhead Suppression

Seedhead Suppression with Metsulfuron

Table 3. Effect of seedhead suppression on stocker cattle and forage quality of pastures grazed. Data were collected from 2009-2012 in three separate studies conducted by the USDA-ARS Forage Animal Production Unit, University of Kentucky.

2009-2010	Chaparral™ Treated	Non-suppressed
Steer ADG (lbs/steer/day)	2.1 lbs	1.48 lbs
Crude protein	14.4%	11.6%
In vitro dry matter digestibility	70.6%	71.7%
2011-2012		
Steer ADG (lbs/steer/day)	2.1 lbs	1.74 lbs
Crude protein	14.2%	9.9%
In vitro dry matter digestibility	71.2%	66.4%
2011-2012		
Steer ADG (lbs/steer/day)	2.39	1.86
Crude protein	18.6	14.8
In vitro dry matter digestibility	76.3	72.6%

(Aiken et al., 2012; Goff et al., 2012a, Goff et al., 2012b)

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Figure: E.S. Flynn and P.B. Burch, uknowledge.uky.edu

Spraying for Seedhead Suppression

Seedhead Suppression with Metsulfuron

Table 2. Effect of seedhead suppression on 205 day adjusted weaning weights of calves and breed back of cows. Data were collected from three different locations owned by Whitesell Land and Cattle Co. At each location the pastures were split into two paddocks so that half the herd would be on a Chaparral-treated paddock (tall fescue seedheads suppressed) and the other half would be on a GrazonNext HL treated paddock (non-suppressed).

Location	205 Day Adjusted Weaning Wt.			Cow Pregnancy Rates	
	Chaparral Treated	Non-suppressed	difference	Chaparral Treated	Non-suppressed
Farm 1	473 lbs	418 lbs	+55lbs	95%	80%
Farm 2	483 lbs	463 lbs	+20lbs	95%	70%
†Farm 3	476 lbs	459 lbs	+17lbs	Equal at 91%	

†Heavy spring grazing on treated and untreated paddocks resulted in seedhead suppression through grazing, thus the non-treated paddock behaved similarly to the suppressed paddock.

Adapted from Boyer et al., 2015

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Figure: E.S. Flynn and P.B. Burch, uknowledge.uky.edu

Seedhead suppression with Metsulfuron is also a good way to avoid seedhead formation if embarking on a renovation program to get rid of E+ tall fescue in pastures. It improves ADG and cow

pregnancy rates while not allowing any viable E+ fescue seed to be set in the year prior to seeding a smother crop the year after. In the study shown in the table above, Farm 3 heavy spring grazed both treated and untreated pastures to suppress seedhead formation, therefore an organic farm might be quite successful in suppressing seedhead formation by just grazing heavily in the spring when tall fescue ordinarily forms seedheads. Unlike a jointed grass like timothy, it only flowers once a year. This means to hit only one pasture at a time. A general recommendation is renovate less than 25 percent of your E+ tall fescue pastures a year anyway.

How do I know if the fescue in my pasture is toxic…? There are endophyte testing laboratories throughout the US. Oregon State's Forage Information System website has a list of laboratories, but is dated as of January 2008. It is a starting point to contact a laboratory before sending any samples in to confirm they still conduct the tests, the turn-around time, and to ensure that contact details, prices, and analyses have not changed. In addition to those labs listed by Oregon State, the University of Tennessee Soil, Plant, and Pest Center also can test for endophyte. They have a form that you can get on-line that can be used for various forage test procedures. The endophyte detection test costs fifteen dollars. It gives specific instructions on how to collect a tall fescue sample.

(Editor's Note: Why don't farmers get rid of E+ pastures? Living with E+ tall fescue requires cattle with a high level of tolerance to it and environmental adaptation. Many tall fescue belt beef cattle farms have been successfully selecting for fescue-tolerant cattle for years, or maybe if the cows did not die or lose extremities or not breed back, it just happened over time that the herd became tolerant to E+ tall fescue. These cattle have shown to be adaptable to a wide range of environmental conditions and thrive in low-input production models in conjunction with sound grazing management mentioned earlier. Light colored beef breeds seem to be more susceptible to ergovaline than dark breeds. This may explain why Black Angus are so prevalent in the tall fescue belt. The black coat of hair would seem to be not ideal in a hot, sunny, humid climate in summer. However, they will seek to wade in water or shade if it is available. It is also best, if buying replacement cattle, to purchase local cattle that have gained tolerance to grazing E+ pastures.)

Jerome Magnuson was the second speaker in this session. He is the Forage and Organic Specialist for DLF Pickseed NA, in Halsey, OR. The title of his presentation was "Advances in Tall Fescue Breeding". He started his presentation with an analogy about tall fescue growers' perceptions about tall fescue by likening their perceptions to 3 blind people feeling different parts of an elephant with one touching the trunk, another its tail, and the third person one of the legs. The person's experience with tall fescue may make them hate it, love it, or be ambivalent about it. They may only be familiar with one aspect of it depending on the variety they were dealing with and the environment it was placed in. He covered some of its varying varietal characteristics and some pitfalls of current nomenclature and ways of determining leaf softness.

He also explained why DLF Pickseed is located in Oregon. The Willamette Valley is ideal for grass seed production as it has rich soil and ample rainfall, but has a 60-day period with no-rain just as the seedheads on cool season grasses have emerged. This allows the harvest of high quality seed.