Campbell County Extension Service

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

The FARMACY

Agriculture & Natural Resources Newsletter

February 2023

Product-Market Fit and Taking the Random Out of Production

Dr. Les Anderson, Beef Extension Professor, University of Kentucky

I received an email last week about receiving an award for 25 years of service to Extension. It seems like yesterday when I rolled down to Lexington to start this new career. One of my most vivid memories was the first UK Beef IRM Committee meeting. The IRM committee had just finished the analysis of a huge survey of beef producers. The only question that stuck in my mind was "Why do you own beef cows?". I thought the answer would be easy; to make money. But the number one response was "because I like cows". "To make money" was the number three reason of those surveyed.

At the time, honestly, I was stunned. Now, after 25 years, I understand a little better. The beef business may be one of the few where profit is likely not the driving factor of ownership. A romanticism exists in agriculture about beef production and/or ranching. But can't we make money and "like cows" at the same time? Profit is possible in the beef industry if producers reorganize the way the think about their beef cattle operation.

The IRM survey suggests that most beef producers don't think of their operations as a small business. Successful small businesses plan and analyze their business to control as many variables as possible. They avoid "random" because random is the opposite of predictable. Small businesses need a predictable product to help achieve product-market fit. The phrase "product-market fit" is used routinely in the business world and it indicates when a business's product addresses and solves the needs of its buyers or the market. Perhaps in the beef industry, we can redefine this as "Does our product match how we are marketing our cattle?"

Random is the norm for production in the beef cattle industry.

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Upcoming Dates:

February 21, 2023 - 6:00 p.m.
Farm Preservation Seminar
Skills to continue the Farm Management Plan
Environmental Education Center

February 23, 2023 - 6:30 p.m.
Private Applicator Pesticide Training
Environmental Education Center

March 13, 2023 - 6:30 p.m.
Sheep & Goat Profit School
Environmental Education Center

March 15-16-17, 2023
A.I. School
Artificial Insemination for Cattle
Bluegrass Stockyards—Lexington

March 28, 2023 - 6:00 p.m.
Making Hay & Growing Grain
Seiter Farm-12424 Flagg Springs Pk.
California, KY 41007

April 15, 2023 - call for appmt.
Bull Breeding Soundness Examinations
Kenton County Fairgrounds

April 18, 2023 - 6:30 p.m.
Herd Health Update & BQCA
Environmental Education Center

Michelle Simon
Campbell County Extension Agent
for Agriculture and Natural Resources

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https://www.facebook.com/CampbellCountyAgricultureandHorticulture/

Product-Market Fit and Taking the Random Out of Production

(continued from page 1)

More than half of beef operations simply turn a bull out with a set of cows and let them calve whenever they want. These operations sell cattle a few at a time and normally sell singles. Selling singles can help pay some bills but it is not a marketing plan, and it does not help producers maximize the value to their product. It doesn't help you profit.

How can we decrease the "randomness" of production? First, control the calving season. Limit your cows to calving over shorter periods of time to help assemble bigger marketing groups. Limiting the calving season also improves labor and production efficiency. Second, control genetics. The best method to control genetics is to AI because of its flexibility. Estrus synchronization and AI requires planning and a little labor but the short- and long-term impact on profitability are well established. Use of this technology also enables producers to control the gender of the calf. Steers typically are $150-200 more valuable at marketing than heifers so removing the randomness of gender can help improve profitability. Imagine managing a 30-cow herd and having 24 steers born within a 30-day period. Not only is this possible but beef producers in Kentucky are already doing this. One of them said "If I am going to stick a straw in them, I may as well stick a straw in that will make me money!". Very true. Reducing "random" suddenly makes marketing easier and profit more attainable.

Controlling the calving season and genetics sets the table. Profitable beef cattle small business owners also control the quality of the product (health and nutrition programs) and minimize the costs of production by implementing quality forage and grazing programs.

The last tool to use to reduce "randomness" of production is record keeping and using the data to help drive production decisions. Beef cattle producers are great note takers but not very good at producing reports and using this data to drive decisions. Collecting and using production data clinches the nail on predictability and, with these other tools, can reduce the randomness of production as much as possible.

Managing a cattle operation for profit is a challenge. One cooperator I had in the UK IRM Farm Program made a statement that really resonates with me. This producer went from a 340-day calving season with no plan to a well-oiled machine that profits even in difficult markets and/or high input costs. He said, "My time is worth more than money. Now I make twice as much and spend half the time!". How did he do it? He removed randomness and improved his product-market fit. One last comment. This producer had cows because he liked cows. Now he likes them quite a bit more!

University of Kentucky
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Private Use Pesticide Applicator Training

with

Campbell County Extension Agriculture Agent
Michelle Simon

Registration Required!

Register at
htpps://campbell.ca.uky.edu/events
or 859-572-2600

Learn how to use pesticides safely!

This training is required if purchasing restricted-use pesticides

Check your license expiration date

Thursday, February 23 at 6:30pm

Campbell County Environmental Education Center

1261 Racetrack Road | Alexandria, KY 41001

Making Frost Seedings of Clover Work

Garth Ruff, Beef Cattle Field Specialist, OSU Extension

Kentucky weather has a wicked sense of humor. At the November board meeting of the Kentucky Forage and Grassland Council, our directors were literally talking about how our 'warmer' winters had backed up the optimum timing for frost seeding clover. And then came 'Coldmeggedon' over Christmas and now a warming trend that will see 60's in late December and early January. Let me paraphrase a saying from my childhood: "Want to make God smile, predict Kentucky weather!" You could say the same thing about predicting the best time to 'frostseed' clovers. Will all of those caveats, let's talk about some things that are a little more certain.

Figure 1. Clovers can be frost seeded successfully into grass pastures because of their quick germination, tolerance to shade and aggressive root and shoot growth as seedlings. Proper attention to establishment basics helps ensure success

To start with, clovers are frankly amazing. Throw six pounds of red and one to two pounds of white clover onto sod with some exposed soil in late winter, control some competition and boom – high quality pasture. The benefits of clover are significant, including 'free' nitrogen, and high forage quality and yield. Even more significant is the new USDA research that clovers (especially red) directly counteract the vasoconstrictive effects of toxic endophyte tall fescue and you have an unbeatable set of attributes.

Frost seeding is an attractive method of establishment because of the minimal equipment requirements – usually a spinner seeder attached to a moderate horsepower tractor or ATV will get the seed spread. Red and/or white clover can be expected to establish successfully after being frost seeded because they germinate quickly, tolerate shading, and have aggressive root and shoot growth as seedlings. Their small, smooth seed is easily moved into the top quarter inch of soil by weather or hoof action.

Figure 2. The heavy ground cover seen here will prevent clover establishment.

Clovers have so many positive establishment traits that it is easy to forget that the requirements of forage establishment must be met even with a low input frost seeding. These basics include:

1. Get a current soil test, and apply the needed nutrients. Clovers need soil that is pH 6.5 to 7 and medium or better in phosphorus and potassium. Do not apply additional N except when diammonium phosphate (DAP) is

needed to supply the needed phosphorus.

2. Select a good variety. Choose an improved variety with known performance and genetics. Choosing a better red clover variety can mean as much as three tons of additional hay and longer stand life compared to common seed (variety unknown). UK has extensive data available on yield and persistence of white and red clover for hay or pasture at http://forages.ca.uky.edu/variety_trials

3. Spread enough seed. A typical seeding rate is 6 to 8 pounds of red or 1 to 2 pounds of white/ladino clover per acre. Applying six pounds of red and one of white will result in over 55 seeds per square foot on the field (37 red plus 18 white).

4. Make sure seed lands on bare soil. Excess grass or thatch must be grazed and/or disturbed until there is bare ground showing prior to overseeding **(Figures 2 and 3)**. The biggest reason for failure of frost seedings is too much ground cover. Judicious cattle traffic or dragging with a chain harrow can expose the needed bare ground.

Figure 3. Bare soil should be showing for successful clover overseeding, as in the picture above.

5. Get good seed-soil contact. Frost seedings depend on rain and snow or the freeze-thaw action of the soil surface **(Figure 4)** to work the clover seed into the top ¼ inch of soil. A corrugated roller used soon after seeding will also ensure good soil contact.

6. Control competition next spring. Do not apply additional N on overseeded fields next spring, and be prepared to do some timely mowing if grass or spring weeds get up above the clover. Clover is an aggressive seeding but will establish faster and thicker if grass and weed competition is controlled.

Figure 4. Hard frosts can create a honeycomb of ice crystals pushing up from the soil surface, bringing up bits of soil with them. Overseeded clover will fall down to the soil surface and be covered by the falling soil from the top of the ice crystals. These seed will germinate with warming temperatures in spring.

Clover can be reliably frost seeded into existing grass pastures with a little attention to establishment basics. Soil fertility, variety, seeding rate, seed placement and competition control are the major contributors to success.

Happy Foraging.

Are More Nodes the Key to Higher Soybean Yields?

Dr. Dennis Egli Professor Emeritus

A common belief among soybean producers is that more nodes are the key to higher yields. Since flowers and pods are produced at nodes, it's obvious that more nodes will result in more pods and higher yield, or so the story goes. This story, however, is not entirely true. Why doesn't this simple relation- ship, that seems so obvious, always work?

This story is appealing because we know that the number of nodes produced by a soybean plant is quite variable. Some of the variation results from the capacity of the soybean plant to add nodes by branching in favorable environments. Early planting will increase the number of nodes while late planting will de- crease them. Late maturing varieties produce more nodes than early maturing varieties. Node number in these two examples is related to the length of the vegetative growth period (seedling emergence to growth stage R5); the longer the period, the more nodes are produced. Taller plants usually have more nodes and increasing population will increase nodes per acre. It's clear that management practices can affect the nodes on a soybean plant or the nodes per acre, making it tempting to postulate a con- sistent relationship between nodes and yield. Unfortunately, this variation in nodes does not necessarily translate into yield.

It's not the number of nodes, it's the growth capacity of a soy- bean field that ultimately determines the number of pods, seeds and finally the yield. So the key to understanding the node – flower - pod – yield relationship lies in the growth of the soy- bean field. Green plants use energy from the sun to fix carbon dioxide into simple sugars via photosynthesis and these simple sugars are the building blocks for all plant and seed tissues. Ade- quate supplies of solar radiation, nutrients and water from the soil, the absence of disease and insect damage and optimum temperatures coupled with enough leaf area to intercept most of the solar radiation ensures rapid photosynthesis and growth, resulting in maximum yield. Any restrictions of these inputs and conditions during reproductive growth will re- duce yield. Simply adding more nodes without an increase in photosynthesis will probably not in- crease yield.

We know that the number of pods (and seeds) produced by a soybean field is determined by the sup- ply of simple sugars from the leaves during flowering and pod set (growth stage R1 to R5). Whether or not a flower or small pod will survive or abort is determined by the supply of these simple sugars from flower opening until the pod reaches its maximum length. This mechanism allows the pod load to adjust to environmental conditions so it matches the productivity of the environment resulting in maximum yield for that environment. A highly productive environment (plenty of sunshine, nutrients and water) results in rapid growth (a large supply of sugars) and many pods, while a poor environ- ment (one with drought stress, for example) produces fewer pods because the supply of sugars is limited.

Adjusting the pod load to environmental conditions creates a balance between the pod load and the ability of the plant to fill the pods and seeds which usually results in normal sized seeds at maturity. I say usually because seed filling (growth stage R5 to R7), occurs after the pod load is established, and environmental conditions can change after growth stage R5 affecting seed filling. Improving weather conditions

after growth stage R5 could result in larger than normal seed, while deteriorating condi- tions (lack of rain for example) could result in smaller than normal seeds. The soybean plant cannot predict future weather when it's setting the pod load any better than the National Weather Service, so sometimes it doesn't get the balance right.

Relating the pod load to the number of nodes instead of the growth rate uncouples the pod load from the productivity of the environment. An uncoupled plant could set too many pods without enough sugars to fill them, resulting in smaller seed. On the other hand, the uncoupled plant could set too few pods, increasing seed size and possibly reducing yield. The soybean plant works the best when the pod load matches the capacity of the plant to fill the pods.

There are always exceptions to every rule and the exception here occurs when soybean plants are very short when, for example, very early maturing varieties are used, drought stress occurs during early vegetative growth, when the crop is planted late in a double-crop system or the population is too low. In these situations the number of nodes can limit pod set and yield. Higher populations are often recommended for early maturing varieties or double-cropping systems to increase the number of nodes and pods per acre resulting in higher yield. But remember, the exception does not disprove the rule. Managing your soybean crop to simply maximize node numbers is not necessarily the path to high yields.

Start the Year Right with Good Record-Keeping Practices

Sources: Steve Isaacs, Extension Agricultural Economist

Record-keeping is not everyone's favorite activity, but with a little time, patience and a commitment to get it done, your financial life will be more peaceful.

Record-keeping tasks don't have to be difficult. Think of it as a way to keep track of your operation that will help you make better long-term decisions. You can use a ledger book or a computer—whatever helps you maintain consistency. Software programs can help you make sense of your data.

Software has become more user-friendly over time, and while it may not make the record -keeping process fun, it could help you see the overall picture of your operation. Some programs track purchases and how you use each item on a particular enterprise or field. You'll be able to keep track of repair and maintenance records for specific farm equipment and produce balance sheets, income statements and cash flow budgets.

For many livestock operations, a good time to start keeping records is when your veterinarian comes to check your animals. Vets usually charge per head, so that data can help you develop a list of animals that need attention. You can use the same data to develop health histories of your animals, which will lead to more informed exams and diagnoses in the future.

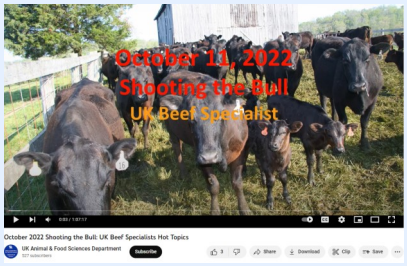
Make record-keeping a team effort for your family. Sit down and work on the records and budget together. Perhaps one person can read the information while another person types it into the software program or writes it in the ledger book. You won't become overwhelmed if you do a little bit each day and don't save it all up for the end of the year. Year-end procedures also can feel more satisfying if you've done the work throughout the year. You can generate year-end reports with a few simple clicks and not have to sort through stacks of bills lying around the home or office.

The University of Kentucky College of Agriculture, Food and Environment's Department of Agricultural Economics has several tools online that could help with budgeting and decision-making. Visit https://agecon.ca.uky.edu/budgets to see what is available.

UK Beef Management Webinar Series

Registration is necessary, send an email directly to Darrh Bullock to registered dbullock@uky.edu Include: Beef Webinar in the subject line and your name and county in the message. You will receive the direct link with a password the morning of each meeting. This invitation will directly link you to the site and you will be asked for the password which can be found just below the link. Each session will be recorded and posted for later viewing.

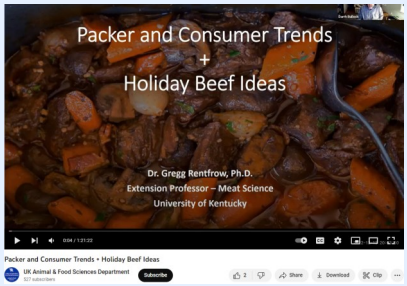
All meeting times are 8:00pm ET / 7:00pm CT



Recording from October 11, 2022
Shooting the Bull: Answering all your Beef Related Questions! – Updates and Roundtable discussion with UK Specialists.

You can view the recording at: https://youtu.be/PXmwX6-9sVQ

Recording from November 8, 2022
From Hay Sample to Feed Bunk: Winter Feeding Considerations for Cattle – Katie Mason, Assistant Professor, University of Tennessee. You can view the recording at: https://youtu.be/micCgvTgAys



Recording from December 13, 2022
Packer and Consumer Trends with Some Holiday Beef Ideas – Gregg Rentfrow, Extension Professor, University of Kentucky and Alison Smith, Kentucky Beef Council Retail and Foodservice. You can view the recording at: https://www.youtube.com/watch?v=XLv7hsA1DlQ

February 14, 2023

Where is the cheap feed? – Dr. Jeff Lehmkuhler, Extension Professor, University of Kentucky will discuss feeding strategies to mitigate current high feed costs. We well also get a market update from Dr. Kenny Burdine, Extension Professor, University of Kentucky

March 14, 2023

Beef Management Update – Management information useful for going into spring breeding and summer stockering will be presented by the Beef Extension Team and other specialists within the college. We will also address any questions from participants.

INSPIRE COUNTY'S FUTURE LEADERS

Ag Tag $10 Donation Benefits 4-H

In 2022, Campbell County raised $3370.00 through the Ag Tag Voluntary Donation program. That's money that goes directly to Kentucky 4-H, Kentucky FFA and Kentucky Proud to support our agriculture community (and its future) here locally and across the Commonwealth.

Agriculture is vital to the livelihood of every Kentuckian and it is through programs like Kentucky 4-H and Kentucky FFA that we continue to instill these values in youth. Each simple $10 donation made when renewing an Ag Tag culminates to have a major impact on the youth of Campbell County.

Kentucky 4-H is one of the most important and influential youth programs in our state and our county. Across Kentucky over 138,600 youth ages 9 to 19 learn about leadership, citizenship and life skills in "learn-by-doing" experiences such as communications and public speaking, through agriculture projects like livestock judging, science projects with robotics, 4-H Camp, Teen Conference, and many other 4-H programs and activities.

Here in Campbell County, over 3,000 youth belong to 4-H and are active in programs and activities such as 4-H Camp, 4-H Horse Camp, Horse and Livestock Clubs, Community Service Project Clubs, Baking Clubs, Prepare for Fair Club, Cloverbuds and the Alexandria Fair.

As we look to March for 2023 Ag Tag renewals, we ask that you remember to make your voluntary donations on each farm license plate you renew. If every Countian renewing an Ag Tag were to make the voluntary $10 donation, $8,000.00 could be raised! Think of the impact that could have on your community and its future leaders!

Please help us in growing leaders, strengthening the agriculture community and funding opportunities for Campbell County youth this March through Ag Tag voluntary donations!

Managing for Foundation Traits in Beef Cows

Author: Charley Martinez, Assistant Professor, University of Tennessee
Author: Troy Rowan, Assistant Professor – Beef Cattle Genomics, University of Tennessee
Author: Justin Rhinehart, Assistant Dean and Professor, University of Tennessee

The beginning of the year marks the start of female and bull buying decisions for producers in the southern states. Whether a producer is selecting for Continental, British, American, or a combo of the three, this publication serves as a reminder of the foundation traits to manage for this buying season. Foundation Traits refer to Stayability, Fertility, Structural Soundness, Udder Quality, Disposition, Adaptability and Maintenance, and Index Selection. Selecting cattle based on these traits can increase the likelihood of the operation being profitable in the short and long term. Below is a description of three of these traits.

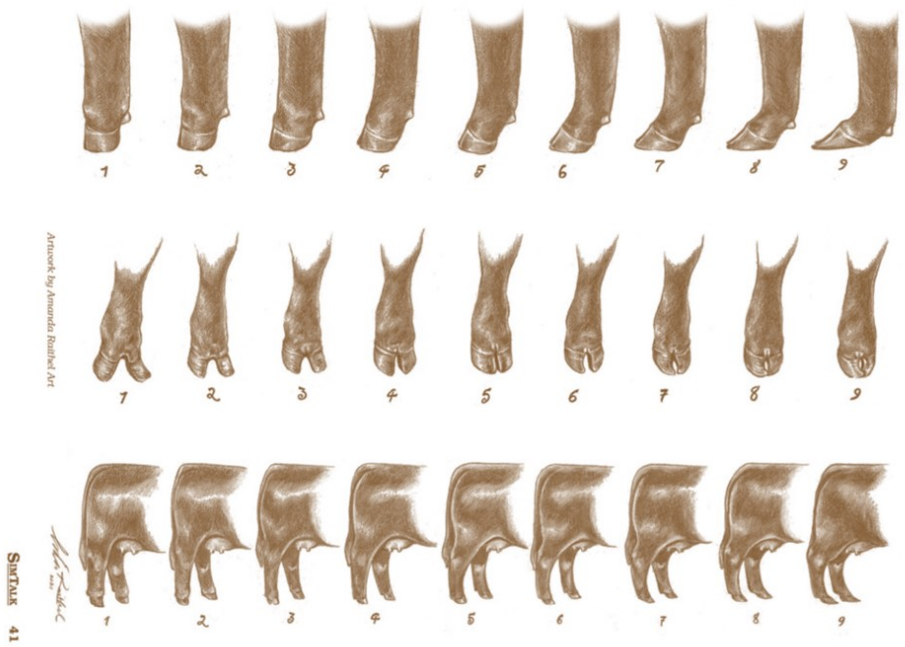


Figure 1. Phenotype scoring scales for foot angle (top), claw set (middle), and side leg profile (bottom). A score of 5 is the most desirable for all three scores.

Image courtesy American Simmental Association

Stayability: a cow's ability to remain in the herd past its "break-even" point is determined by multiple traits. The all-encompassing phenotype that is recorded by many breed associations is called Stayability (STAY). Stayability measures the likelihood that a bull's daughters will remain in the herd long enough (typically 6 years old) to recoup their development and maintenance costs if they breed on time.

Fertility: In concert with Stayability, maintaining fertile females and keeping daughters out of bulls that are fertile is critical to the herd's profitability. Failing to rebreed is the most common reason cows are culled from herds. That said, a surprising number of cows get a second chance when open. The extra feed and variable costs required to maintain that cow will hinder the profitability of the operation if it stays in the herd. When a cow misses a calf, it does not become profitable until year 7 or 8, depending upon calf prices. If a cow misses twice, it does not become profitable until year 11. Thus, while it is possible for cows that miss a calf to be profitable, it takes more years to realize that profit, which makes fertility a critical financial driver.

Structural Soundness: Cattle must have good feet and leg structure to graze, travel, and breed, and the discomfort of poor feet and leg structure reduces the time they spend grazing or drinking. Besides directly impacting performance, it creates animal welfare issues. Hoof trimming and other management interventions may prolong an unsound cow's productive life, but these are likely to incur costs and significant additional labor. Figure 1 displays scores for foot, claw, and side leg.

Figure 1. Phenotype scoring scales for foot angle (top), claw set (middle), and side leg profile (bottom). A score of 5 is the most desirable for all three scores.

Image courtesy American Simmental Association

The impacts of foundation traits on cowherds reach far beyond making a producer's life easier. Many of these traits have direct costs that impact the bottom line, while others add labor. This additional labor often is confused with convenience, but its actual financial cost is often undervalued or completely ignored. A producer's time is worth something! Depending upon a producer's breeding and calving seasons, the cost of spending additional time or incurring additional variable costs affects the operation's profitability and efficiency. A more in-depth description of the foundation traits can be found here.

Martinez, Charley, Troy Rowan, and Justin Rhinehart. "Managing for Foundation Traits in Beef Cows." Southern Ag Today 3(2.3). January 11, 2023. Permalink

KY Sheep & Goat Check-Off

KY Sheep & Goat CHECK-OFF

Overview: The Kentucky Sheep and Goat Council will fund four Hoof Trimming Clinics in 2023. Funds may be used for hoof trimming kits, biosecurity supplies, speakers, and general supplies like copies. This program is a reimbursement grant and will not be issued until all guidelines of the grant agreement are met.

Eligibility: Funds will be made available to local/regional sheep/goat groups within the state of Kentucky.

Funds: Maximum request $700

Timeline: **Applications are due March 30, June 30, and September 30.** Applications will be reviewed at the quarterly Checkoff Board meetings in April, July, or October. Granted funds must be used by December 30, 2023. All unused funds must be returned.

Grant Requirements:

- Grantee must submit a report of the event within 30 days from completion, including receipts
- Grantee must conduct an evaluation of participants and include the results in the report (evaluation will be provided)
- Grantee must use the Kentucky Check-Off logo on all promotional materials such as flyers, websites, social media, etc.
- Grantee may only apply for a second grant, 1) If the first event is completed and report has been reviewed by the Checkoff Board, and 2) if funds are still available.

Topics that should be covered during the clinic:

1. General hoof structure and care
2. Identification of disease- (difference between scald, foot rot, and hoof abscesses)
3. Disease prevention methods
4. Proper trimming technique
5. Treatment methods- foot baths, topical treatments, antibiotics

Note: The Kentucky Check-Off Board will provide all approved applicants a Foot Rot fact sheet that can be used during the clinic that will cover basics of the topics listed above.

Anyone interested in applying can download an application **HERE**.

Please send all questions to Kelley Yates, kyates@kysheepandgoa.org or 502-682-7780.

Kelley Yates
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Winchester, KY 40391
502-682-7780
www.kysheepandgoat.org
https://www.facebook.com/KySheepAndGoatOffice

The Navigability of WOTUS

Author: Jennifer Shaver Friedel, J.D., Director, Land Use-Value Assessment Program
Professor of Practice, Virginia Tech

For well more than a decade, every year has brought a new wave of WOTUS uncertainty. At all but the stroke of midnight to close out 2022, the EPA announced the final revised WOTUS rule which is set to take effect this spring, 60 days after publication in the Federal Register. If headlines about WOTUS over the past decade have confused you, fear not. You're not alone. The two steps forward – one step back progression of the hunt for WOTUS clarity follows a switchback trail of previous and current administrations. Despite this brand-new rule, the uncertainly might not be over just yet.

Since the inception of the modern-day Clean Water Act ("CWA"), enforcement agencies and citizens alike have been seeking to define "water of the United States" in an effort to determine where federal jurisdiction of a body of water begins and ends under the CWA. Sparing the dirty details, there have been four WOTUS eras worthy of mention here.

First, commonly referred to as the "Pre-2015 Rule," the WOTUS rule in place since the 1980s was constructed through regulation and the implementation of key agency memoranda shaped by seminal judicial opinions.[1] The second era of mention began in 2015, when the EPA and Army Corps of Engineers (the "Corps") issued a new rule, also known as the "Clean Water Rule" which was broader in application and was simultaneously praised as a long-overdue revision of the WOTUS rule, and also criticized as a gross overreach of authority. Due in part to legal challenges, the EPA and the Corps delayed implementation of the 2015 Clean Water Rule until 2020. Meanwhile, in 2019, the Trump administration repealed the 2015 Clean Water Rule and in 2020, proposed yet another new WOTUS rule, the "Navigable Waters Protection Rule," or "NWPR," the third mentionable WOTUS era.

The NWPR reversed course from the 2015 Rule, narrowing the scope of WOTUS and federal jurisdiction under the CWA by setting forth four categories of waters falling under CWA jurisdiction which included territorial seas, traditionally navigable waters and interstate waters; tributaries and lakes, ponds, impoundments directly or indirectly contributing surface water to traditionally navigable waters; and wetlands adjacent to these. Once again, litigation quickly took center stage. The NWPR was short-lived as President Biden's administration sought to provide a workable, more stable definition of WOTUS and nix the never-ending uncertainty that has plagued the CWA since its inception.

The fourth and current era officially began on December 30, 2022, when the EPA and the Corps finalized the latest WOTUS rule. Under the new final rule, using the Pre-2015 Rule as a foundation, tributaries and impoundments as well as wetlands adjacent to traditionally navigable water that are either "relatively permanent" or have a "significant nexus" to traditionally navigable waters will fall under the CWA's jurisdiction. The new rule sets forth that it's "relatively permanent standard" refers to "relatively permanent, standing or continuously flowing waters" connected to traditionally navigable waters or waters with a "continuous surface connection to such relatively permanent waters." The rule also defines a "significant nexus" as where waters "either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of traditional navigable waters, the territorial seas, or interstate waters." Finally, the new rule states that "adjacent wetlands" are those which have a "continuous surface connection to a relatively permanent, standing or continuously flowing water" connected to traditionally navigable waters

(continued on next page)

"or must either alone or in combination with similarly situated waters significantly affect the chemical, physical, or biological integrity" of traditionally navigable waters, territorial seas or interstate waters.[2] WOTUS clarity, in large part, hinges on these defined terms and the ability of these terms to be readily identified and applied.

In its release of the new rule, the EPA also published a *"Fact Sheet for the Agricultural Community"* which sets forth the agricultural exemptions from CWA jurisdiction and specific exclusions in the final rule. Among the exemptions are "normal farming, silviculture, and ranching activities" with examples listed; construction of farm or stock ponds or irrigation ditches and maintenance of drainage ditches; and construction or maintenance of farm roads in accordance with best management practices. Prior converted cropland also remains excluded from the final rule so long as it is available for agricultural commodity production, such as crop production, haying, grazing, agroforestry, or idling land for conservation uses.[3]

Currently, the nation awaits the Supreme Court's decision in Sackett v. EPA, wherein the Supreme Court is asked to determine the proper test for determining which wetlands constitute WOTUS. The Supreme Court is expected to announce its decision early this spring. The anticipated ruling has the potential to affect the latest WOTUS final rule and send the EPA and Corps back to the writing room or alternatively, to affirm the appropriateness of the new rule as written. For today, a new WOTUS rule reigns. Time will tell whether the hunt for WOTUS clarity is over or whether litigation, both new and old, will keep WOTUS in the trenches

[1] *See SWANCC v. U.S. Army Corps of Engineers,* 531 US 159 (2001), and *Rapanos v. U.S.*, 547 US 715 (2006).
[2] EPA, Pre-Publication Final Rule Notice: Revised Definition of 'Waters of the United States.'" 6560-50-P (December 2022) pp. 9-10.
[3] EPA, "Final Rule: Revised Definition of 'Waters of the United States' Fact Sheet for the Agricultural Community December 2022."

PLAN. EAT. MOVE.

Bourbon Street Chicken

Servings: 6 **Serving Size: 1 cup**

College of Agriculture, Food and Environment

Nutrition facts per serving:
420 calories; 12g total fat; 2.5g saturated fat; 0g trans fat; 130mg cholesterol; 400mg sodium; 27g carbohydrate; 0g fiber; 13g sugar; 10g added sugar; 49g protein; 0% Daily Value of vitamin D; 4% Daily Value of calcium; 10% Daily Value of iron; 10% Daily Value of potassium.

Ingredients:

- 1 tablespoon olive oil
- 2 pounds boneless chicken, cut into bite-size pieces
- 2 teaspoons garlic powder
- ¼ teaspoon ginger
- ½ teaspoon crushed red pepper flakes
- ¼ cup applesauce
- ¼ cup light brown sugar
- 2 tablespoons ketchup
- 1 tablespoon apple cider vinegar
- ½ cup water
- 2 tablespoons Worcestershire sauce
- 1 (10-ounce) bag frozen stir-fry vegetables and rice

Directions:

1. Heat oil in large skillet over medium heat.
2. Add chicken pieces and cook until lightly browned.
3. Except for vegetables and rice, add the rest of ingredients to the skillet. Stir until well mixed.
4. Bring to a hard boil, reduce heat, and let simmer for 10 minutes. Meanwhile, cook vegetables and rice according to package instructions.
5. Serve chicken over vegetables and rice.

Source: *District Four Nutrition Education Program*

Reproductive Failure in Cattle – *Frequently Asked Questions about Leptospirosis*

Dr. Michelle Arnold, UK Veterinary Diagnostic Laboratory

"Reproductive failure" is an all-encompassing term if a cow loses a calf during pregnancy or if she fails to get pregnant. Causes of reproductive failure are often divided into infectious and non-infectious categories. Examples of "non-infectious" include poor cow nutrition (lack of energy and micronutrients such as selenium/Vitamin E); bull infertility, disease, and injury; breeding season management (shortened breeding season, insufficient bull-to-cow ratios); genetic and some congenital abnormalities that result in fetal death; and toxic agents such as nitrates, phytoestrogens, and drugs including steroids and prostaglandins. "Infectious" causes are bacteria, viruses, protozoal and fungal agents that directly or indirectly damage the placenta and/or the fetus. Examples include the BVD virus, IBR virus, the protozoan Neospora caninum and many species of the bacterium Leptospira, among many others. This series of articles will explore the most common infectious causes of abortion and reproductive failure in cattle and available options for control and prevention.

What is Leptospirosis or "Lepto"? Leptospirosis is a complicated bacterial disease commonly associated with abortions, stillbirths, premature births, and infertility in cattle. However, this bacterium also causes sickness and death in cattle, dogs, sheep, and horses worldwide and is an important zoonotic disease affecting an estimated 1 million humans annually. Farmers, veterinarians, and those working in meat processing facilities are at highest risk to contract the disease.

What causes leptospirosis? The disease is caused by a unique, highly coiled, Gram-negative bacterium known as a "spirochete" belonging to the genus Leptospira. These "leptospires" are highly motile due to their spiral shape and, once inside a host animal, they enter the bloodstream and replicate in many different organs including the liver, kidney, spleen, reproductive tract, eyes and central nervous system. The immune system will produce antibodies that usually clear the organism from the blood and tissues rather quickly except from the kidney. Leptospires take up residence primarily in the kidney and are excreted in the urine for months to even years after infection, depending on the species of Leptospira and the animal infected. Less frequently, leptospires persist in the male and female genital tract and mammary gland of females and may be excreted in semen, uterine discharges, and milk.

How do cattle become infected with leptospires? Transmission of the organism is most often through direct contact with infected urine, placental fluids, semen, or milk. However, transmission may also occur by coming in contact with areas contaminated with infected urine, such as stagnant ponds or swampy areas with standing water. The leptospires survive in the environment for long periods of time (approximately 6 months in the right conditions) in stagnant water as well as in warm and moist soils but die quickly when dry or in cold temperatures. Entry into the animal may be through penetration of intact mucous membranes such as through the mouth and the conjunctiva of the eye, or through damaged or water-softened skin. The organism may also be transferred during breeding and also during pregnancy from dam to fetus.

Which animals carry ("host") this organism and are responsible for spread of disease? This is where the complicated life cycle of this organism must be explained to understand the wide range of disease symptoms that may be observed in cattle. To begin, it is important to distinguish two different types of "hosts": 1) maintenance or reservoir hosts and 2) incidental or accidental hosts. A "maintenance host" is an animal that can carry and spread the leptospirosis organism but not experience any obvious sickness from it. These are also known as "reservoir hosts" because this animal's immune system allows the leptospires to survive and duplicate themselves then be excreted in urine and spread to other animals. Maintenance hosts for leptospires are often wildlife species including skunks, rats, raccoons, and opossums but can be domestic animals (dogs) or livestock (pigs, cattle), depending on which type of leptospire (known as a "serovar") is involved (Table 1). For example, cattle serve as the maintenance host for the Leptospira serovar called "Hardjo type hardjo-bovis", often abbreviated as "Hardjo". Transmission from one infected cow to another healthy cow with serovar Hardjo is efficient, and the infection rate can be very high in an

Table 1: Common Leptospira Isolates in Ruminants			
Species	Serovar	Maintenance Host	Incidental Hosts
L. borgpetersenii	Hardjo (type hardjo-bovis)	Cattle (repro failure)	Sheep, goats
L. kirschneri	Grippotyphosa	Raccoons, muskrats, squirrels	Cattle, sheep, horses, dogs
L. interrogans	Pomona	Swine, opossums, skunks, raccoons	Horses, cattle, sheep, goats, dogs
L. interrogans	Canicola	Dogs	Cattle
L. interrogans	Icterohaemorrhagiae	Rats	Dogs, cattle, swine
L. interrogans	Bratislava	Pigs, mice, horses	Dogs, cattle, horses
L. interrogans	Hardjo (type hardjoprajitno)	Cattle-Europe only (milk drop)	Sheep, goats

unvaccinated herd. When a cow is initially infected with serovar Hardjo, she may exhibit a few mild signs such as low fever but there will be very little antibody production by the immune system and the leptospires will stay primarily in the kidney and be persistently shed in her urine for a prolonged period of time (months to years). In addition, the organism can also localize in male and female reproductive tracts and be shed in semen and uterine discharges.

An "incidental host" or "accidental host" is an animal that gets infected with a Leptospira serovar not normally found in that animal (infected "by accident") which results in clinical disease that may be severe. Incidental hosts are not reservoirs of infection and transmission of the organism is uncommon within a herd. Infection of an incidental host usually occurs in areas contaminated with urine from maintenance hosts. For example, cattle are incidental hosts for the Leptospira serovar "Pomona" which is carried by feral swine, opossums, skunks, and raccoons (the maintenance hosts) and transmitted to cattle from water or feed contaminated with their urine. Once infected, cattle (especially calves) with Pomona often show significant signs of disease, the immune system rapidly produces antibodies and there is a short carrier state in the kidney when cattle shed the organism in urine.

What are the symptoms of leptospirosis? Clinical signs or symptoms of disease in cattle depend on which Leptospira serovar is involved and if cattle serve as a maintenance host or incidental host for this specific type. There are over 250 serovars of Leptospira but the two most important serovars affecting cattle in North America are Hardjo and Pomona, with Grippotyphosa, Canicola and Icterohaemorrhagiae much less frequently diagnosed. Most bovine leptospirosis is caused by the serovar Hardjo, which causes infertility and reproductive failure. Cows with Hardjo are twice as likely to fail to conceive and experience a significantly longer time interval from calving to conception.

Infection in pregnant cows with non-Hardjo strains, mostly Pomona and Grippotyphosa, results in abortion (usually late term), stillbirth, or birth of premature and weak infected calves. Retention of fetal membranes may follow abortion. Lactating dairy cows may exhibit "milk drop syndrome", characterized as a drop in milk production for 2-10 days where the milk has the consistency of colostrum, thick clots, yellowish color, and high somatic cell count, but the udder remains soft. In calves, a severe, rapidly progressing disease may occur when infected with incidental serovars, especially Pomona. Symptoms of high fever, extreme weakness, red urine, rapid breathing due to anemia and death are all possible. Cows may experience a loss of milk production with very prolonged recovery.

How is leptospirosis diagnosed and treated? Diagnosis of this disease is not necessarily a simple task. Traditionally, two blood samples (in red top blood tubes) drawn at least 1 week apart after an abortion are submitted to measure antibodies against the most common serovars. Incidental infections (for example, Pomona) will show a rapid rise in antibody numbers (called "titers") over time that are diagnostic. However, since cattle are the maintenance host of serovar Hardjo, the antibody numbers may remain low if reproductive failure is due to Hardjo. Vaccination also confuses the interpretation of results because blood tests do not differentiate antibodies due to infection or antibodies due to vaccine. Therefore, multiple types of tests may be required to rule this

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Reproductive Failure in Cattle

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disease in or out. Currently, urine is the preferred sample as it can be tested for leptospires through a variety of assays, especially PCR, to identify the organism. Animals diagnosed with leptospirosis can be treated with injectable long-acting oxytetracycline to remove the organism from the kidney. Research is ongoing if additional treatment is needed to clear infections within the genital tract. Consult your veterinarian for detailed advice regarding diagnosis and treatment options.

What methods are used to control and prevent leptospirosis in cattle?

New infections are best prevented through early vaccination with products containing the most common serovars affecting cattle. The leptospirosis fraction of most reproductive vaccines is often denoted as "L 5" in the vaccine name, representing Hardjo, Pomona, Grippotyphosa, Canicola and Icterohaemorrhagiae. In addition, several vaccine manufacturers have added extra protection against serovar Hardjo type hardjo-bovis and this is denoted with "HB" in the vaccine name. Spirovac® (Zoetis) is a vaccine for Leptospirosis only, specifically for the prevention of infection by Leptospira borgpetersenii serovar Hardjo type hardjo-bovis, including reproductive and renal tract colonization, and urinary shedding for up to 12 months. It is worth mentioning that cattle already infected with leptospirosis must be treated with antibiotics first to remove the organism before vaccination is effective.

Control is accomplished by prevention of exposure, annual vaccination and treatment if needed. Reduction of cattle exposure to infected urine, especially fencing off stagnant ponds and swampy areas, and preventing urine contamination of feedstuffs will significantly reduce transmission of the organism. Personal protective equipment should be used when working with cattle suspected to be infected to prevent human disease.

Bovine Venereal Diseases – Should You be Concerned?

– Dr. Michelle Arnold, UK Veterinary Diagnostic Laboratory

"Reproductive failure" is an all-encompassing term if a cow loses a calf during pregnancy or if she fails to get pregnant. Causes of reproductive failure are frequently divided into infectious and non-infectious categories. Examples of "non-infectious" include poor cow nutrition (lack of energy and micronutrients such as selenium/Vitamin E); bull infertility, disease and injury; breeding season management errors (shortened breeding season, insufficient bull-to-cow ratios); genetic and some congenital abnormalities that result in fetal death; and toxic agents such as nitrates, phytoestrogens, and drugs including steroids and prostaglandins. "Infectious" causes are bacteria, viruses, protozoal and fungal agents that directly or indirectly damage the placenta and/or the fetus. Examples include the BVD virus, IBR virus, the protozoan Neospora caninum, the bacterium Leptospira, and the venereal diseases trichomoniasis and vibriosis, among many others. This series of articles will explore the most common infectious causes of abortion and reproductive failure in cattle and available options for control and prevention.

The most common venereal diseases of cattle are trichomoniasis and vibriosis, often referred to as "trich" and "vibrio", respectively. Bovine trichomoniasis is caused by the protozoan Tritrichomonas foetus (T. foetus) while vibriosis is caused by the bacterium Campylobacter fetus subsp. venerealis (C. fetus) Although both are infrequently diagnosed, the results of infection on reproduction can be devastating. Both trich and vibrio are transmitted through physical contact when a bull breeds a cow. Once a cow is infected, she acts as a source of infection for other non-infected bulls within the herd which then spread disease to other cows. Infected bulls show no signs of disease, however, either pathogen in cows causes genital infection characterized by early abortions, low pregnancy rates, and prolonged calving seasons. In herds that do not check females for pregnancy, these diseases appear simply as cows coming up open that should be calving. Economic losses result due to the reduced size of the calf crop, reduced weaning weights because of late calves, and the costs associated with diagnosing, culling and replacing infected cattle. Diagnostic testing for venereal diseases is not necessarily easy or inexpensive, so prevalence and economic impact are likely underestimated. If a bull tests positive for either disease, he will most likely remain infected for life. There is no effective treatment, so the cornerstone of control is based on identifying and culling infected bulls and replacement with virgin bulls.

T. foetus, the protozoan parasite responsible for trich, lives deep within the folds of skin (crypts) on the bull's penis and prepuce (Figure 1). Once infected, bulls are considered infected for life and there is no effective treatment available, although young bulls (1-2 years old) can occasionally clear the infection. Older bulls, ages 5 and above, have more mucosal folds and deeper crypts than younger bulls, creating the perfect environment for persistent survival of the organism. Infected bulls show no signs of disease and semen appears normal on a breeding soundness examination (BSE) but spread of the organism to cows often results in abortions early in the first trimester. These pregnancy losses are typically noticed as an increased number of repeat breeders, irregular heat

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Bovine Venereal Diseases – Should You be Concerned?

(continued from page 19)

cycles, longer calving intervals and reduced pregnancy rates. Newly infected cows may still conceive but the pregnancy is resorbed 40-70 days post-breeding. In some infected cows, the uterus may become filled with pus that can be observed on the tail of the infected cow or heifer. Affected cows can mount an immune response and clear the infection from the reproductive tract in as little as 90 days but usually 4-5 months are necessary before the cow can rebreed, conceive then carry a calf to term. Immunity in the cow does not last and cows can be re-infected with the organism. There is no treatment for bulls infected with trich. Once diagnosed in a herd, recommendations include either culling all bulls or test and cull positive bulls and replacing them with virgin bulls that are satisfactory breeders based on breeding soundness examinations. A vaccine is available (TrichGuard® by Boehringer-Ingelheim Vetmedica) and considered a useful management tool for cows experiencing problems or at increased risk for exposure to the disease. In a herd outbreak, it is generally recommended for all females to be given two doses of the T. foetus vaccine to decrease the convalescent period. Females exposed to the bull and found open should be culled or segregated into a separate breeding group for breeding after immunity develops. Consult with your local veterinarian for vaccination recommendations and protocols tailored to your specific farm needs.

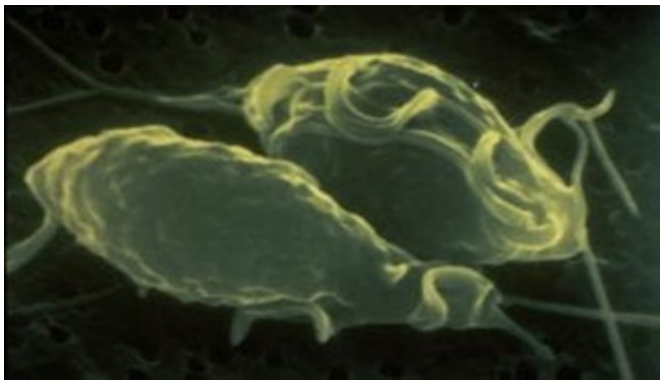


Figure 1: Tritrichomonas foetus is a protozoan parasite that can cause reproductive failure in cattle

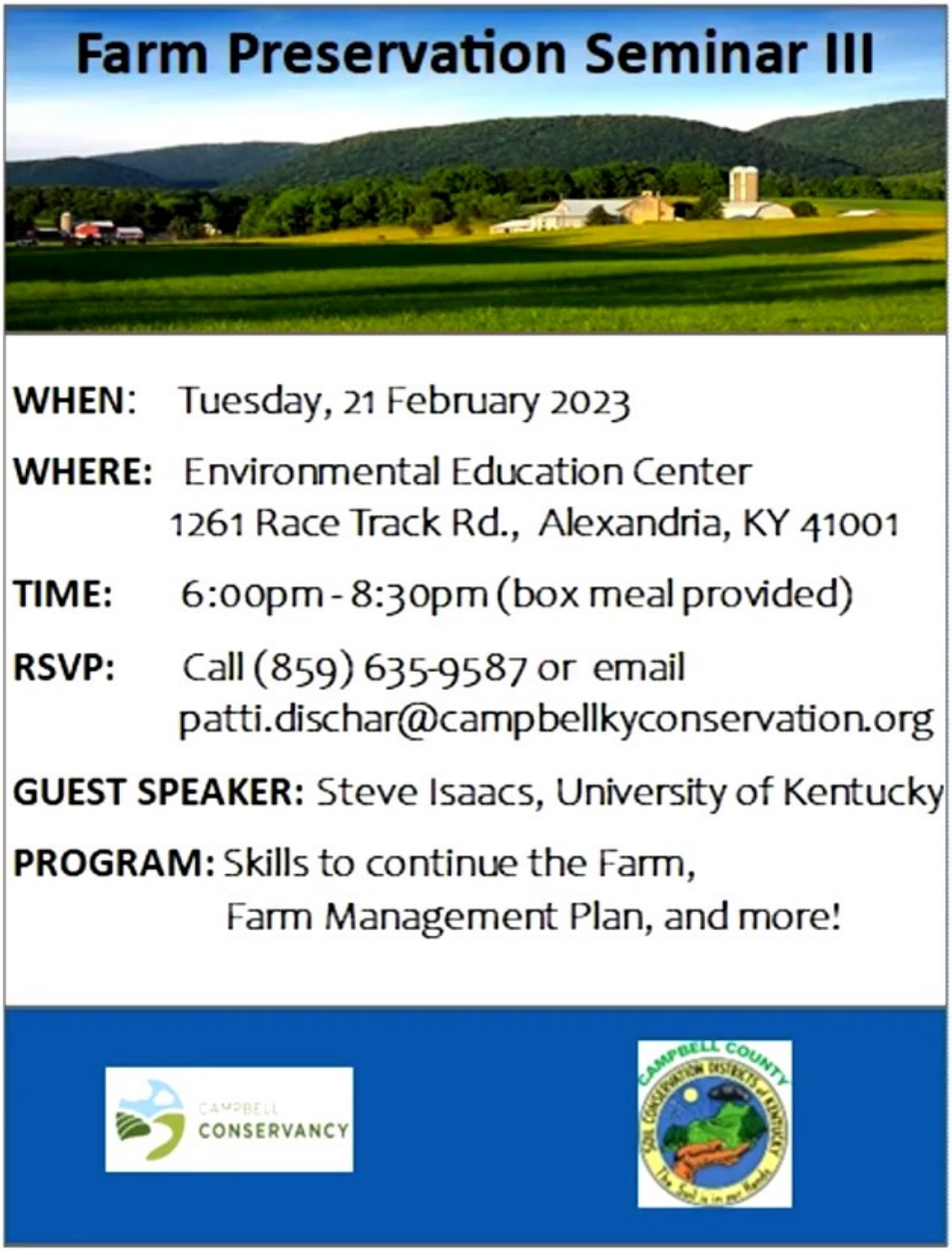
Diagnosis of trich is by identification of the organism either from a skin scraping of the penis or a sample of cervical mucus from an infected cow placed in special media (a "trich pouch") and shipped at room temperature to a veterinary diagnostic laboratory. The UKVDL has a polymerase chain reaction (PCR) test that accurately identifies this organism. Trichomoniasis diagnosis and control are coordinated at the state, not federal, level. Therefore, each state determines cattle entry requirements, the test to be used and whether positive results are required to be reported to state officials. Most states require bulls to have either one negative PCR test or three negative cultures taken at one week intervals to be considered test negative. Bulls must have a minimum of 4 days without sexual activity before they are sampled. Some states have adopted a new, more sensitive PCR that does not require a 24-hour incubation in the "trich pouch" and must be shipped cold or frozen.

Campylobacter fetus subsp.venerealis (C. fetus), the cause of vibriosis, is also found on the skin of the prepuce and penis of bulls. As with trich, bulls do not show any signs of infection, no alteration of semen and bulls remain infected for life. Infected cows exhibit reproductive failure, irregular heat cycles, and embryonic or fetal death. The cow may remain infertile for 3-5 months before immunity develops. However, a major difference from trich is that there are effective vaccines for use in cows and bulls available against vibriosis, typically denoted by a "V" in the name of the vaccine. Consistent use according to label directions provides strong protection against genital infection. Testing for vibrio usually involves the collection and culture of a sample scraped from the sheath of a bull or vaginal fluids from a suspect cow. The bacterium responsible for vibrio is very temperature sensitive and commonly dies on the way to the diagnostic laboratory if transport of more than 24 hours is required. PCR tests have been developed and while not perfect, they are a vast improvement over previous diagnostic methods. Testing for vibriosis is only recommended for investigating poor reproductive performance when other causes have been ruled out.

Appropriate management of the breeding herd helps prevent introduction of venereal diseases. The most important step is to purchase only virgin or test negative bulls for herd sires and virgin heifers as replacements. Additional recommendations include:

- Maintain as young a bull battery as possible as older bulls are more likely to develop chronic infections;

- Do not borrow, rent, lease or buy untested bulls that have been used for breeding (see Figure 2). Test non-virgin bulls at least once by PCR before introducing them into the herd;
- For routine screening of larger bull batteries with a low risk of disease, many labs offer PCR on pooled samples of up to 5 bulls on one test;
- Breed purchased cows and heifers in a separate herd for at least one season;
- Control animal movement between farms by maintaining good fences to prevent infected bulls from mixing with uninfected animals;
- Utilize artificial insemination, when possible, to eliminate the risk of sexually transmitted diseases as well as improve the genetics of the calves;
- Cull all open cows and heifers and strongly consider culling those that conceived late in the breeding season; culture any cows with pus in the uterus found during pregnancy examination;
- Submit all aborted fetuses and placental tissue to a veterinary diagnostic laboratory for determination of the cause of any reproductive failure.;
- A short, controlled breeding season and good records help identify a breeding problem quickly. Reproductive failure can result from a wide variety of infectious and non-infectious causes. A sound herd health program, developed with your veterinarian, will help minimize the risk of this failure and the associated economic loss.



University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

SHEEP & GOAT PROFIT SCHOOL

March 13, 2023
6:30pm - Dinner
7:00pm - Program

Campbell County Environmental Education Center
1261 Race Track Road | Alexandria, KY 41001

TOPICS:

- NATIONAL SHEEP IMPROVEMENT GENETIC PROGRAM
- INTERNAL PARASITES & FAMANCHA SCORING
- NUTRITION
- PRODUCING MARKET LAMBS

SPEAKERS:

DR. DON ELY &
DR. DEBRA AARON
UK SHEEP & RUMINANT NUTRITION SPECIALISTS

Register at
https://campbell.ca.uky.edu/events
or 859-572-2600

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Feeding & Maintaining your Senior Horse

Learn about feed ingredients to consider in the diet and strategies to maintain body condition and overall health

Speaker: Dr. Bob Coleman, UK Equine Specialist

April 6, 2023
6:30pm

at the Campbell County Environmental Education Center
1261 Race Track Road
Alexandria, KY 41001

Registration Required!
Register at
https://campbell.ca.uky.edu/events
or 859-572-2600

Cooperative Extension Service
Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

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LEXINGTON, KY 40546

Disabilities accommodated with prior notification.

Herd Health Update...

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Beef Quality and Care Assurance Training

April 18, 6:30 p.m.

Environmental Educational Center

1261 Race Track Road, Alexandria, KY 41001

Dr. Michelle Arnold, UK Extension Veterinarian

Register by calling 859.572.2600
or online at www.campbell.ca.uky.edu

Program Topics will include:

- Selecting a Vaccine and Wormer for Your Cows and Calves
- **Changes to Antibiotics Laws and Availability**
- Timing of Vaccines and Wormers
- Cattle Handling Facilities

Ky-BQCA
KENTUCKY BEEF QUALITY & CARE ASSURANCE

Meets CAIP Educational Requirement

Cooperative Extension Service
Agriculture and Natural Resources
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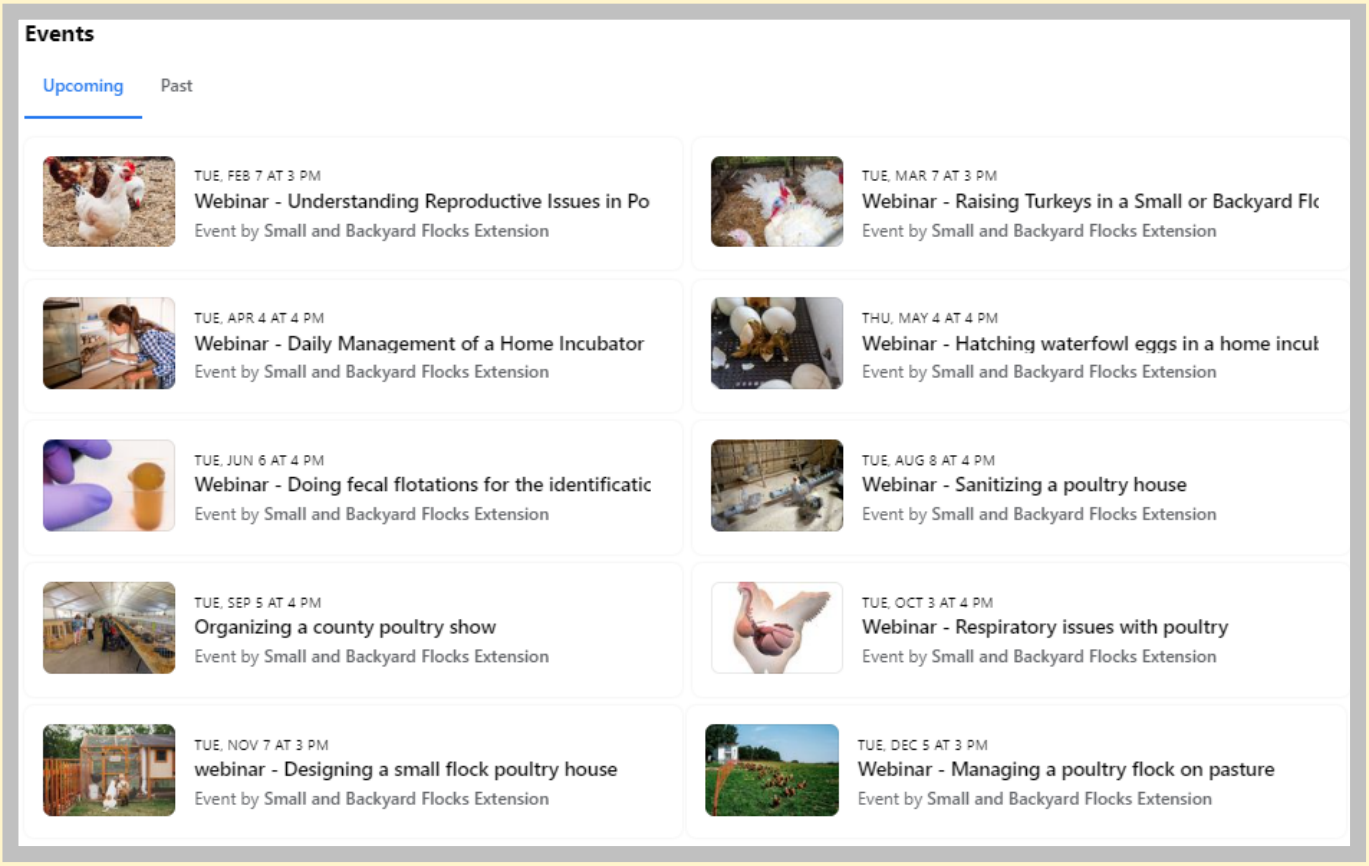
4-H Youth Development
Community and Economic Development

LEXINGTON, KY 40546

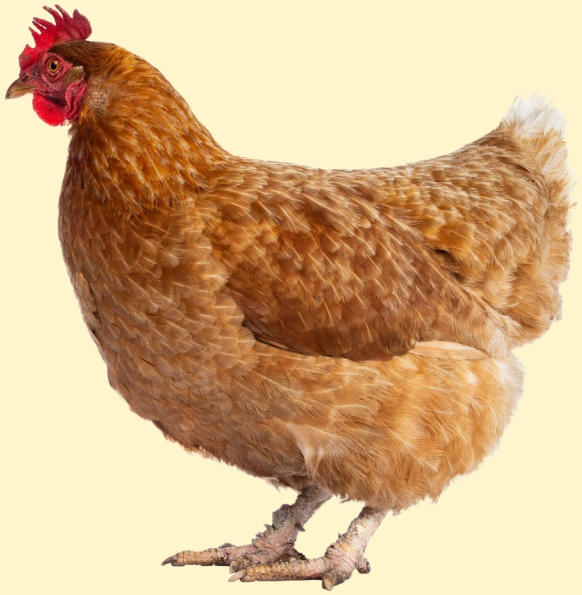
Disabilities accommodated with prior notification.

Extension Poultry Webinars Series

https://www.facebook.com/poultryextension/upcoming_hosted_events



- **Reproductive issues with small and backyard poultry flocks** (February 7, 2023 @ 3 PM Eastern)
- **Raising turkeys in small and backyard flocks** (March 7, 2023 @ 3 PM Eastern Time)
- **Daily management of a home poultry incubator** (April 4, 2023 @ 3 PM Eastern Time)
- **Hatching waterfowl eggs in a home incubator** (May 4, 2023 @ 3 PM Eastern Time)
- **Doing fecal flotations for the identification of intestinal parasites in poultry** (June 6, 2023 @ 3 PM Eastern Time) – The day is subject to change due to the availability of the speaker.
- **Sanitizing in a poultry house** (August 1, 2023 @ 3 PM Eastern Time)
- **Organizing a county poultry show** (September 5, 2023 @ 3 PM Eastern Time)
- **Respiratory issues with poultry** (October 3, 2023 @ 3 PM Eastern Time)
- **Designing a small flock poultry house** (November 7, 2023 @ 3 PM Eastern Time)
- **Managing a poultry flock on pasture** (December 5, 2023 @ 3 PM Eastern Time)



Is your herd bull ready for breeding season?

COOPERATIVE EXTENSION

University of Kentucky
College of Agriculture, Food and Environment

Kentucky State University
College of Agriculture, Food Science, and Sustainable Systems

Is he sitting down on the job?

Bull Breeding Soundness Examinations

Saturday, April 15, 2023

at Kenton County Fairgrounds

Cost per bull for examination
$25 for NKCA members - $50 for non-members
Vaccinations are additional

- **Exams by licensed Veterinarians**
- **For all breeding age bulls (over 12 months old)**
- **Semen test**
- **Physical examinations**
- **Vaccinations and deworming available for extra charge**

APPOINTMENT REQUIRED

Please call the Boone County Extension Service at 859-586-6101 By April 14 to schedule an appointment.

(program will be cancelled if there are less than 25 bulls)

Michelle Simon
Campbell County Extension Agent for Agriculture

Sponsored by:

Northern KY Cattle Association UK Cooperative Extension Service

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