Master Cattleman Quarterly

Oklahoma State University

Efficiency and cow-calf production

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Cow-calf producers use a variety of efficiency measures to help manage production systems. Many of these are technical efficiencies that capture physical measures of output and input use and range from very specific measures to more broad-based values that incorporate a range of production components. For example, pregnancy percentage focuses on breeding efficiency and highlights management of cow body condition and can indicate reproductive failures in cows and bulls. Calving percentage incorporates prenatal calf mortality in additional to pregnancy percentage while weaning percentage adds calf mortality to calving percentage.

Weaning weights are a basic measure of productivity while pounds of calf weaned per exposed female is a much more robust measure of reproductive and nutritional efficiency. Better yet, pounds of weaned calf per acre also adds in forage management and stocking rate. Technical efficiency measures are very useful to monitor and manage particular components of production systems. However, excessive focus on technical measures, especially very narrow ones, can misdirect management attention. Technical efficiency measures tend to emphasize maximums (such as weaning weights) or minimums (such as death loss). Often times, maximums and minimums are not optimal in terms of economic outcome. Data certainly shows, for example, that the most profitable cow-calf operations often do not have the highest weaning weights.

Economic efficiency measures go beyond technical efficiencies to include values of inputs and outputs as well. Economic efficiencies demonstrate that efficiency can change due to changes in output and/or input values even when physical efficiency is unchanged. A good example is least cost feed rations where ration composition can change, not because the nutrient contribution of feedstuffs changes, but simply due to changing values of feed ingredients.

Economic efficiency measures tend to focus on optimal levels rather than physical maximums and minimums. For example, dollars of return per cow will reign in excessive focus on weaning weights by recognizing that some means of increasing weaning weights, such as increasing cow size, may be very expensive and not efficient at some point. For many cow-calf operations the land investment is the biggest component and the final assessment of economic efficiency is returns per acre. This incorporates physical animal components related to reproductive, nutritional, and health productivity along with feed and forage management plus output values and input costs.

Typically, a combination of technical and economic efficiency measures are needed to manage an operation for maximum economic returns. Technical efficiency measures are critical to understand physical productivity and identify weaknesses or failures in production systems. However, excessive focus on technical efficiency can be detrimental. Economic efficiency measures focus on optimal use of inputs relative to the value of outputs. However, changes in output values or input costs can lead, for example, to improved returns due solely to changing market conditions while masking stagnant or even declining physical productivity. It takes both to ensure that the operation is moving in the right direction. The first step is to measure productivity and input use in a good record system. Then put those records to use.

Jan. 2020, Vol. 45

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MASTER CATTLEMAN

The 3 Stages of Parturition

Glenn Selk, Oklahoma State University Emeritus Extension Animal Scientist

As the calendar turns to a new year, the spring calving season approaches. Many spring calving herds will begin the calving season around the first of February, if not before. An increased understanding of the "calving" or parturition process is helpful. The more we understand about the physiology of the process, the more likely we are to make sound decisions about providing assistance. Parturition or "calving" is generally considered to occur in three stages.

Stage 1: The first stage of parturition is dilation of the cervix. The normal cervix is tightly closed right up until the cervical plug is completely dissolved. In stage 1, cervical dilation begins some 2 to 24 hours before the completion of parturition (2 to 6 hours would be most common). During this time the "progesterone block" is no longer present and the uterine muscles are becoming more sensitive to all factors that increase the rate and strength of contractions. At the beginning, the contractile forces primarily influence the relaxation of the cervix but uterine muscular activity is still rather quiet. Stage 1 is likely to go completely unnoticed, but there may be some behavioral differences such as isolation or discomfort. At the end of stage one, there may come behavioral changes such as elevation of the tail, switching of the tail and increased mucous discharge. Also relaxation (softening) of the pelvic ligaments near the pinbones may become visually evident, giving a "sunken" appearance on each side of the tailhead. **Checking for complete cervical dilation is important before forced extraction ("pulling") of the calf is attempted.**

Stage 2: The second stage of parturition is defined as the delivery of the newborn. It begins with the entrance of the membranes and fetus into the pelvic canal and ends with the completed birth of the calf. So the second stage is the one in which we really are interested. This is where we find all of the action. Clinically, and from a practical aspect we would define the beginning of stage 2 as the appearance of membranes or water bag at the vulva. The traditional texts, fact sheets, magazines, and other publications that we read state that stage 2 in cattle lasts from 2 to 5 hours. Data from Oklahoma State University and the USDA experiment station at Miles City, Montana, would indicate that stage two is MUCH shorter. In these studies, assistance was given if stage two progressed more than two hours after the appearance of water bag at the vulva. The interesting thing about the data was that the heifers calving unassisted, did so in about one hour after the initiation of stage two, and mature cows calved within an average of 22 minutes of the initiation of stage two. Those that took longer needed assistance. These and other data would indicate that normal stage two of parturition would be redefined as approximately 60 minutes for heifers and 30 minutes for adult cows. In heifers, not only is the pelvic opening smaller, but also the soft tissue has never been expanded. Older cows have had deliveries before and birth should go quite rapidly unless there is some abnormality such as a very large calf, backwards calf, leg back or twins. If the cow or heifer is making good progress with each strain, allow her to continue on her own. Know your limitations. Seek professional veterinary help soon if you encounter a problem that cannot be solved easily in minutes.

Stage 3: The third stage of parturition is the shedding of the placenta or fetal membranes. In cattle this normally occurs in less than 8 to12 hours. The membranes are considered retained if after 12 hours they have not been shed. Years ago it was considered necessary to remove the membranes by manually "unbuttoning" the attachments. Research has shown that manual removal can be detrimental to uterine health and future conception rates. Administration of antibiotics usually will guard against infection and the placenta will slough out in 4 to 7 days. **Contact your veterinarian for the proper management of retained placenta.**

An important ingredient for your calving season preparation is the Oklahoma State University Extension Circular E-1006: Calving Time Management for Beef Cows and Heifers. Cow calf producers will want to download this free circular and read it before the first calf is born this spring.

Effect of Heifer Calving Date on Longevity and Lifetime Productivity

Britt Hicks, Area Extension Livestock Specialist

Longevity and lifetime productivity are important factors influencing profitability in a cow-calf operation. If a heifer calves earlier in the calving season (first 21-day period), they have more time to heal and resume cycling before the next breeding season commences in order to maintain a 365-day calving interval. Calves born earlier in the calving season will also be older and heavier at weaning. An ongoing study conducted at the University of Saskatchewan in western Canada and published research from South Dakota State University and the U.S. Meat Animal Research Center (USMARC) clearly demonstrate the importance of early conception in beef heifers. In these studies, heifers were grouped based on when they calved in their first calving season (first 21 days - day 1 to 21; second 21 days - days 22 to 42; or greater than 42 days after the start of the calving season).

In all three studies, heifers that calved with their first calf during the first 21-day period of the calving season remained in the herd longer (greater longevity) as compared with heifers that calved in the second 21-day period, or later. Average longevity for South Dakota heifers that calved in the first or later period was 5.1 and 3.9 years, respectively. Average longevity in the USMARC heifers that calved in the first, second, or third period was 8.2, 7.6, and 7.2 years, respectively. In the Canadian study, heifers that had their first calf during the first 21-day period of the calving season had increased longevity compared with heifers that calved in the second and third 21-day periods (7.2, 6.5, and 6.2 years for period 1, period 2, and period 3, respectively).

These data also indicated that the females that calved early as heifers tended to calve earlier throughout the remainder of their productive lives than the females that calved later in their first calving. Due the fact these heifers calved earlier, their calves were older and heavier at weaning. In the USMARC data the weaning weight of the first 6 calves born to heifers that calved in the first calving period of their first calving season was greater than those of heifers that calved in the second or third period of their first calving season. Furthermore, calving period influenced the total pounds weaned and average weaning weight, with heifers that calved during the first period having increased weaning weights, total pounds weaned, and average weaning weights compared with heifers calving in the second or later period. Similarly, heifers calving during the second period had increased weaning weights, total pounds weaned, and average weaning weights compared with heifers calving later.

In the Canadian data, when lifetime productivity for each animal was pooled, calf actual average weaning weight and average adjusted 205-day weaning weight were 33 lb heavier and 20 lb heavier, respectively, for period 1 and 2 cows compared to period 3 cows. The average number of lifetime calves weaned for cows that calved in the first, second, and third 21-day periods was 5.4, 4.5, and 4.2 per cow, respectively. Due to the combined effects of greater average number of calves weaned over lifetime and actual calf weaning weight, cows that had their first calf during the first 21-day period had greater total weight weaned (2551 lb) compared with heifers that calved in the second (2087 lb) or third (1855 lb) 21-day period.

In conclusion, the results of these studies clearly illustrate that developing heifers to conceive early in the breeding season and subsequently calve early in the calving season is critical for heifer longevity in the herd as well as for performance of her progeny in subsequent generations. This occurs because those heifers will have a longer interval to rebreeding. Calves born earlier in the calving season will be older and thus, heavier at weaning. Moreover, in their lifetime, heifers that calved during the first 21-day period of their first calving season weaned approximately one more calf compared with heifers that calved later in the calving season.

A LITTLE TRIVIA ABOUT COWS

- Cows have no upper front teeth. They press their sharp bottom teeth against the top hard palate of their mouth to cut blades of grass.
- A cow has 32 teeth, and will chew about 40-50 times a minute.
- A cow will chew for up to eight hours a day
- Cows move their jaws about 40,000 times a day.

Calf Vigor

Barry Whitworth, DVM ,Area Food/Animal Quality and Health Specialist for Eastern Oklahoma

The initial overall physical strength and good health of a newborn, referred to as calf vigor, is very important to the future health of a calf. In order for a calf to thrive, it must accomplish several things within hours immediately after being born. The calf must be able to sit up (sternal recumbency), stand, locate the teats and nurse. Any delay in nursing will have a major impact on the calf's future since the immunoglobulins that are present in a cow's colostrum are best absorbed in the first 4 hours of life. Immunoglobulins are what protect a calf from disease causing agents, and the absorption of immunoglobulins rapidly declines 12 hours after birth. Calves that are vigorous at birth have a much better outlook on a healthy future than those that are less vigorous and are not able to stand and nurse soon after birth.

Assessing a calf's vigor and recognizing when to intervene and help a calf is something all producers need to be able to do. In human medicine newborn babies undergo an APGAR test following birth. APGAR stands for appearance, pulse, grimace, activity, and respiration. The test is given 1 and 5 minutes after birth. The purpose of the test is to assess how well the baby tolerated the birthing process and how well the baby is doing outside the mother's womb. An APGAR test for calves similar to the one in human medicine would give cattle producers a clue when to intervene in a newborn calf's live. Unfortunately, most attempts to develop such a test for calves have not been successful; however, there are several studies that provide some practical advice on when to intervene with a newborn calf.

In two studies Dr. Homerosky and associates in Canada found two good predictors of calf vigor. Consuming colostrum within the first 4 hours following birth was dependent on calving ease and suckle reflex. Most producers have the ability to assess both components. First, was the calf born in a timely manner and required no assistance. Calves that require assistance are more likely to have acidosis. Acidosis is associated with failure of immunoglobulin absorption, sickness and death in calves. Dr. Homerosky found a correlation between acidosis and the inability of a calf to withdrawal its tongue after being pinched. A producer can check a calf for acidosis by pinching the calf's tongue. If a calf cannot withdraw their tongue after being pinched, it is likely acidotic and is a good candidate for early colostrum intervention.

The second predictor producers can check for is does the calf have a strong suckle reflex. Suckle reflex can be determined by inserting two fingers in the mouth and rubbing the roof of the calf's mouth. A calf that has strong jaw tone with a rhythmic suckle would be determined to have a strong suckle reflex. The opposite of this would be considered a weak suckle reflex and may indicate the need for intervention.

In another study Dr. Murray found that calves that did not sit up (sternal recumbency) within 15 minutes of birth had reduced absorption of immunoglobulins. Also, calves born to cows that had difficulty birthing took longer to stand. These would be clues that the calf will require more care and colostrum intervention to increase the chance of survival.

Most producers are capable of assessing calf vigor based on the above parameters. Any calf born to a cow that has difficulty birthing and or a calf that has problems with the above tests would be a candidate for early intervention. The best treatment for these calves is to give the calf 2 to 3 liters of colostrum from the mother within the first 4 hours of life. Any delay in getting colostrum into the calf will only increase the chance of the calf having problems in life. This does require more work from the producer but should pay off with more pounds of beef at weaning.

If producers would like more information about calf vigor, they should contact their local veterinarian or local Oklahoma State University County Extension Educator.

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Business Reminders for the New Year

Roger Sahs, Assistant Extension Specialist

Another year in the cattle business is in the books. While it is likely that calf and cattle prices will be stable to modestly higher in 2020, the cattle industry may face any number of profitability challenges such as economic growth, trade disruptions, record pork and chicken production, and volatile feed prices. Successful cattle producers have a flexible and adaptable game plan that deals with the swings in the weather and markets. And while there are a number of ticket items that can help keep the operation in the game, two profit points listed below should be on everyone's list.

Don't neglect your pasture productivity. Proper stocking rates are a key variable concerning the long-term economic and environmental sustainability of a livestock enterprise. There is a frequent misconception that goes something like this "In this county, I can run a cow for every 10 acres." The best grazing managers know that rates are ranch specific and monitor their forage so that they know how much forage they have and how much they need. They consistently check rainfall, available forage levels, and body condition scores relative to the class of livestock and reproductive stage. Many of the greatest ranch failures, both economically and ecologically speaking, have come from rigid stocking rates no matter what the forage conditions.

The second ticket item is keeping accurate and up to date production and financial records. Few producers get excited about a good set of records, but when it comes to profitability, you need to manage your ranch as a business. A good set of records can reduce some rather unpleasant surprises. For instance, some producers believe "If I can run one more cow, that's more profit." One more cow does not always equal one more dollar of profit, but it does mean higher input costs. Adding a cow can be profitable if a property is underutilized, but the reality is that most properties are grazed at a moderately heavy or higher rate already. One more cow may be that tipping point at which costs exceed revenue. Good records can serve as foundation for cow-calf enterprise budgets that can help determine if running more cows makes sense from a financial standpoint.

In today's cattle industry, it is important to focus on financial management as much as production performance. Producers need to have an eye for detail, be able to follow set procedures, and understand the risks involved. As the above reminders show, successful operators monitor their pasture conditions and keep good records, both financial and production. A cattle producer interested in being profitable should expect to do no less.

For more information on these profit points and other ways to improve your operation, contact your County Extension Educator - Agriculture at your local Oklahoma Cooperative Extension Service office.

Some Basic Herd Benchmarks from the 2017 Oklahoma Beef Management and Marketing Survey

Kellie Curry Raper, Professor and Livestock Marketing Specialist, Agricultural Economics

How is your cow math?

The 2017 Oklahoma Beef Management and Marketing Survey (OBMM) asked producers to self-reported across several herd management categories. Oklahoma producers who participated in the OBMM survey report an average cow weight at weaning of 1156 pounds with an average body condition score (BCS) of 6 on a BCS scale of 1 to 10. A quick look at more of that data indicates that producers reported average calf weaning weights of approximately 541 pounds with the average calf weaning age at 7 months. The death loss rate for calves between birth and weaning was approximately 5%, on average, across herds reporting. That translates to about a 95% weaning rate for calves born. For comparison, the most recent information on mortality from the National Animal Health Monitoring Survey (NAHMS, 2010) reports a slightly lower 93.6% weaning rate across all herd sizes. On average, pounds weaned per cow exposed was approximately 530 pounds.

Why do these numbers matter? Granted, these are simple averages across multiple operations. But benchmarks are important. At a snapshot in time, they help us compare how we match up with other operations. Across time, these numbers help us determine how management decisions and outside environmental factors like weather impact productivity. So how is your cow math?

February dates set for OSU Chisholm Trail Beef Improvement Conference

Donald Stotts, Oklahoma State University, Agricultural Communications Services

Cattle producers looking to maximize the efficiency of their operations should register now to attend one of two Chisholm Trail Beef Improvement Conference events set for **Feb. 20** in Lawton and **Feb. 21** in Fairview.

Sponsored by the Oklahoma Cooperative Extension Service, the conference is a merger of two past successful events: The Cattle Trails Wheat and Stocker Conference and the Northwest Oklahoma Beef Conference.

"We will be focusing primarily on herd health this year," said Dana Zook, Oklahoma State University Cooperative Extension area livestock specialist headquartered in Enid. "A variety of options are available to vaccinate cattle, but the process can be confusing. Every sector of the beef industry is affected by the added costs of treating animal sickness."

Cost is $25 per participant to each of the events, which will begin at 8:45 a.m. and finish by 2:30 p.m. On-site registration with refreshments will start at 8 a.m.

The Feb. 20 event will take place at the Great Plains Coliseum, located at 920 SW Sheridan in Lawton. The Feb. 21 Fairview event will take place at the Major County Fairgrounds, located at 808 E. Highland St. in Fairview. The conference agenda will be the same for both events.

Oklahoma is the nation's second-leading producer of beef cows. (Photo by Todd Johnson, OSU Agricultural Communications Services)

Registration forms for both conference events are available through all OSU Cooperative Extension county offices.

"We are asking participants to pre-register as it greatly aids our planning for meals, refreshment breaks and conference materials, helping us to ensure everyone has the best conference experience possible," Zook said.

Dr. Rosslyn Biggs, OSU Cooperative Extension beef cattle specialist and veterinarian, will kick off the conference sessions with an overview of proper vaccine handling and storage techniques, and basic administration protocols.

Dr. Bruss Horn, veterinarian and owner of the Verden Veterinary Clinic, will then provide the latest insights about stress and pain management in calves. He also will lead a discussion about the importance and ease of testing procedures relative to persistently infected bovine viral diarrhea calves.

The OSU College of Veterinary Medicine's Dr. John Gilliam will lead participants through discussions about the importance of calf vaccinations, including the impact of modified live and killed vaccines.

Following the sponsored lunch, John Richeson, associate professor of animal science at West Texas A&M University, will highlight how calf health links to feedyard performance.

The final afternoon session will be led by Derrell Peel, OSU Cooperative Extension livestock marketing specialist. Peel will showcase how animal health begins at the ranch.

"It's our hope to not only increase awareness about cattle health, but also showcase how the concerns of individual sectors are linked one to another," said Marty New, OSU Cooperative Extension area livestock specialist headquartered in Duncan.

Additional information about the 2020 Chisholm Trail Beef Improvement Conference events is available by contacting New by email at marty.new@okstate.edu or by phone at 580-255-3674, or Zook by email at dana.zook@okstate.edu or by phone at 580-237-7677.

The Oklahoma Cooperative Extension Service is one of two state agencies administered by OSU's Division of Agricultural Sciences and Natural Resources, and is a key part of the university's state and federally mandate teaching, research and Extension land-grant mission.

Planning Calendar for Beef Cow Calf Operations

OSU Fact Sheet ANSI-3260

Time	Basic Program Recommendations	Considerations to Discuss with Veterinarian
60 days pre-calving all females	If management is adequate, should not need any vaccinations. Evaluate BCS	Scours vaccinations
Pre-calving	Evaluate facilities and environment Equipment: sterile, proper function Review protocol for monitoring and when to assist delivery Monitor herd for nutrition and separate by age and BCS to manage feed intake appropriately	Quality colostrum Frozen colostrum Colostrum supplements Colostrum substitutes
Calf born	Individually identify Record birth Assure adequate Colostrum	Dip navels, weigh calves Castrate Dehorn (complete)
Breeding Bulls	Viral respiratory diseases (IBRV, BVDV) Leptospirosis Parasite control program (location and season dependent)$_b$ Breeding soundness examination	Pl_3V, BRSV Vibriosis
Start breeding Heifers	Start breeding heifers 30 days or more before cows	
Start breeding adult cows		
Remove Bulls	45-90 days after introduction depending on goals	
Branding time-calves 2 to 4 months	Individually identify (if not already performed): brand, ear tag Castrate Dehorn (complete) Clostridial:7- or 8– way (location dependent) Parasite control program (location and season dependent)$_b$	Brucellosis (bangs) - heifers - (marketing decision) Follow age restrictions Viral respiratory diseases Leptospirosis Pinkeye Tetanus
Weaning 5 to 9 months	Clostridial: 7– or 8-way (location dependent) 4-way or 5 –way viral respiratory diseases (lBRV, BVDV, Pl_3V, BRSV) Leptospirosis Weigh Calves and evaluate BCS and growth	Brucellosis (bangs) - heifers—(marketing decision) (follow age restrictions) Preweaning/weaning vaccination program Weaning/post-weaning vaccination program Pinkeye

Planning Calendar for Beef Cow Calf Operations (cont.)

Time	Basic Program Recommendations	Considerations to Discuss with Veterinarian
Weaning 5 to 9 months (cont)	BCS and Pregnancy test cows and evaluate culling criteria	
	Parasite control program (location & season dependent)$_b$	
Replacement Heifers 13 to 16 months	4– or 5-way viral respiratory diseases (IBRV, BVDV, Pl_3V, BRSV)	Make sure individually identified Vibriosis
	Leptospirosis	
	Clostridial: 7– or 8-way (location dependent)	
	Parasite control program (location & season dependent)$_b$	
	Monitor growth: Rule of Thumb-heifers should weigh 65 percent of mature weight at start of breeding season	
Process adult Cow Herd	Viral respiratory diseases	Pl_3V, BRSV
	Parasite control program (location & season dependent)$_b$	Anaplasmosis control
	Leptospirosis	Vibriosis
	Evaluate individual animals: udder, eyes, disposition, feet, joints, legs, soundness	
	Pregnancy check and evaluate culling criteria	
	Evaluate BCS	

$_b$Follow all label directions and your veterinarian's recommendations.

More discussion can be found in fact sheet ANSI-3260 at http://factsheets.okstate.edu/documents/ansi-3260-a-planning-calendar-for-beef-cattle-herd-health/

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