



# Environmental



*Environmental factors such as matching cows to their environment, heat stress and immunity to disease affect herd fertility.*

*by* **KASEY BROWN**, *associate editor*;  
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& **TROY SMITH**, *field editor*

Forage is not always a least-cost feed resource, and cow-calf producers must be conscious of matching their cows to their forage resources. David Lalman, Oklahoma State University (OSU) animal scientist, told attendees of the 2014 Applied Reproductive Strategies



For every 100 lb. of increased mature cow weight, her calf weighs an additional 6 lb. at weaning, said OSU's David Lalman. The value of that added calf weight ranges from \$5 to \$7, while the annual cost of the additional cow weight is \$42.



# Impact

since 1997, pounds of mature weight have been increasing. Fat composition decreases when overselecting for muscle, simply meaning that the body dilutes fat with more muscle. To balance the amount of fat needed for proper body condition, the cow has to get heavier.

He said research indicates that for every 100 pounds (lb.) of increased mature cow weight, her calf weighs an additional 6 lb.

at weaning. The value of that added calf weight probably ranges from \$5 to \$7, but the annual cost of that 100 lb. of additional cow weight is \$42.

He added, “Seventy percent of energy that produces a pound of beef comes from cow maintenance.”

“We’ve been teaching guidelines based on condition that reflects the nutrient status that maximizes reproductive

performance. A major limitation is that we focus on short-term effects on reproduction,” Lalman said. “Tough times don’t last, but tough cows do.”

He asserted that a long-term commitment is needed to improve a cow’s environmental match without needing to increase inputs. Moderation in size, milk

*(Continued on page 52)*

in Beef Cattle (ARSBC) symposium in Stillwater, Okla., Oct. 8-9, that cows need to match their environment efficiently.

Efficient cows reach sexual maturity early, have a high rate of reproduction, low rates of dystocia, longevity, minimum maintenance requirements, and the ability to convert forage resources to pounds of beef, he said.

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Genetic trends in cattle are changing, though. In all breeds but one, milk genetic trends are increasing. More milk means higher yearlong maintenance requirements. This is related to greater visceral organ mass relative to empty body weight. He emphasized that the relationship of milk production to the conversion of calf weaning weight is not efficient, because the calves are just swapping grass for milk.

“Is there a limit of milk production that your forage can support?” he challenged.

Aggressive selection for muscle also affects a cow’s maintenance requirements and size. He noted that in the Angus breed, while height trends have been flat

The normal rectal temperature for beef cows is 101.3°-101.5° F. University of Florida's Peter Hansen suggested conception rates can decline when rectal temperatures reach 102.2°. Cows experiencing heat stress will first exhibit low estrous behavior, he noted. This is often observed in lactating cows, in which anestrus occurs.



## Environmental Impact

(from page 49)

and muscle is needed, and he suggested keeping only early-born and early-bred heifers. Additionally, buy (or keep) bulls out of cows that always calve early. Purchase a bull out of cows that are managed like yours.

Tools are available to help select efficient females. He suggested using residual average daily gain (RADG), residual feed intake, longevity and stayability expected progeny differences (EPDs); selection indexes for maintenance and profit; and the Angus optimal milk module.

— by Kasey Brown

## Heat stress and fertility

Peter Hansen, University of Florida, gave attendees of the ARSBC symposium five take-home messages when considering heat stress and its effects on reproduction.

**“Heat stress has a long carryover effect on oocyte production. This also occurs in the cycle of sperm production.”**

— Peter Hansen

**No. 1: Heat stress affects most aspects of reproduction, but especially fertility.** Only a limited number of reproductive management techniques increase fertility during heat stress, but there are steps to monitor and account for its effects.

The normal rectal temperature for beef cows is 101.3°-101.5° F. Hansen suggested conception rates can decline when rectal temperatures reach 102.2°.

A cow experiencing heat stress will first exhibit low estrous behavior, according to Hansen. This is often observed in lactating cows, in which anestrus occurs.

“Lactating cows burn as much energy as human athletes but must lose heat to prevent hyperthermia,” Hansen

(Continued on page 54)



► To effectively monitor heat stress, Peter Hansen recommended using an iButton device, approximately the size of a dime, which can fit inside a CIDR.

**Environmental Impact** *(from page 52)*

said. “Lactation really makes the cow susceptible to heat stress.”

**No. 2: Heat stress can compromise fertility many weeks later.** A follicle today started its cycle 120 days prior to ovulation. Hansen addressed the issue of heat stress “compromising an oocyte” both prior to ovulation and several weeks later,

including disrupting fertilization, and fetal growth.

“Heat stress has a long carryover effect on oocyte production,” he said. “This also occurs in the cycle of sperm production.”

**No. 3: An easy and effective way to determine whether cows are suffering from heat stress is to measure body**

**temperature.** Hansen emphasized proper temperature monitoring is measuring body temperature, not the outside temperature. To effectively monitor heat stress, he suggested use of an iButton device, approximately the size of a dime, which can fit inside a CIDR®. The reusable iButton downloads and sends data for rectal temperature to a computer for monitoring.

**No. 4: To date, Hansen’s research**

**suggested the only reproductive technique known to increase fertility during heat stress is embryo transfer;** the rest is management of cattle exhibiting heat stress.

**No. 5: Hansen noted that the best long-term solution to heat stress is to use cattle that are genetically adapted to heat stress.**

— by *Katy Kemp*

**Impact of vaccination**

Cow-calf producers often have questions about how different types of vaccines and the timing of vaccination may affect reproductive performance in their breeding herds. According to John Gilliam, an OSU veterinarian and assistant professor, they typically ask about products used to immunize cattle against infectious bovine rhinotracheitis (IBR) and bovine viral diarrhea (BVD). Gilliam talked about choosing and using these vaccines.

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— *John Gilliam*

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Regarding the relative need to immunize breeding animals against IBR and BVD, Gilliam said vaccination can reduce pregnancy losses associated with these diseases, as compared to nonvaccinated animals.

“There is solid evidence that reproductive vaccination can improve reproductive performance,” stated Gilliam. “Vaccination has significant value.”



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Questions then arise regarding whether it is best to use a modified-live virus (MLV) vaccine vs. a vaccine containing a killed virus. Gilliam explained that, in theory, MLV products offer a quicker, more robust and longer-lasting immune response. A second administration, or booster shot, may not be required in some cases. By comparison, a killed-virus vaccine is

*(Continued on page 56)*

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## Environmental Impact

(from page 54)

considered safer and less apt to prompt an undesirable reaction, but a booster is required to achieve immunity.

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**“Prebreeding vaccination offers optimum immunity during the period of highest risk to reproductive loss, and there is no abortion concern, but it may require additional handling of cattle.”**

— *John Gilliam*

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Most reproductive-disease vaccine labels indicate that prebreeding is the optimum time for administration. For the sake of convenience, however, many producers would prefer to vaccinate at the same time cattle are undergoing pregnancy examination. Gilliam said the timing of vaccination can influence choice of vaccine type.

“Prebreeding vaccination offers optimum immunity during the period of highest risk to reproductive loss, and there is no abortion concern, but it may require additional handling of cattle,” said Gilliam. “Vaccinating during pregnancy (at preg-check) minimizes handling, but the period of optimum immunity may not match the period of highest risk.”

Gilliam said it is difficult to find clear-cut evidence regarding the risk of abortion following vaccination, relative to type of product used. Neither is there definitive evidence of passing colostral immunity to the calf after vaccinating a pregnant cow.

However, Gilliam said there is enough evidence suggesting heightened abortion risk that producers have “cause for pause” when considering vaccination of pregnant animals with an MLV product. Additionally, the safety of MLV vaccine is a concern when vaccinating too close to breeding time. Administering the vaccine less than 28 days prior to breeding is an extra-label use and can have negative effects on fertility.

“Vaccines are safe when given according to label directions,” stated Gilliam, reminding producers that no vaccine offers 100% protection every time.

— *by Troy Smith*



**Editor’s Note:** *Lalman, Hansen and Gilliam spoke during Wednesday’s session focused on the impact of environment and management on cow herd efficiency. Visit the Newsroom at [www.appliedreprostrategies.com](http://www.appliedreprostrategies.com) to view their PowerPoints, read their proceedings or listen to their presentations. Compiled by the Angus Journal editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force and provides comprehensive coverage of the symposium.*