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BEEF COW MANAGEMENT

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Physiology of Reproduction

One of the most important aspects of a beef cow operation is that of reproduction. Reproductive physiology is not very well understood by a lot of people and the importance of reproduction is sometimes minimized. Reproduction has been cited as being 10 times as important economically as growth traits. In other words, if the beef cow doesn't have a calf she is a failure even though she may have the potential for producing a heavy calf at weaning time.

The average calf crop in the United States is below 80%, indicating that reproductive efficiency is an extremely important economic problem to cattlemen. Animal experts indicate that production techniques such as selection, crossbreeding, parasite control, etc., can increase weaning weights of calves by 20, 30 or 40 pounds. However, a herd can be very productive in terms of individual weaning weights yet very poor when calf crop percentage is considered.

PUBERTY

The age at first heat is known as puberty. This is the period in the heifer's life when she becomes capable of reproducing and when the reproductive processes become functional. Generally puberty occurs before maximum body size is attained and subsequently nutrients must supply the needs for body growth and the growth and development of her young. The young cow has more stress and requires a greater nutrient supply when bred than a mature cow.

TABLE 1. Effect of Calf Crop Percentage on Average Pounds of Calf per Cow

% Calf Crop	Average Weaning Weight per Cow Bred				
100	600	550	500	450	400
90	540	495	459	405	360
80	480	440	400	360	320
70	420	385	350	315	280

Before puberty the female reproductive organs slowly develop in size but show no functional activity. When a certain age and/or body weight is reached the first heat period and ovulation occurs. Sometimes the first ovulation is not accompanied by a heat period. The age at puberty varies according to breed, nutrition and other management factors. In cattle, puberty can occur anytime between 4 and 14 months.

A lower plane of nutrition or anything which slows growth rate delays the onset of puberty. A higher plane of nutrition hastens the time of puberty and results in heavier weights at that time. Heifers that gain more rapidly to weaning and from weaning to over a year of age reach puberty faster. This indicates that good nutrition during the first year of a heifer's life is imperative to breeding to calve at 2 years of age.

One disadvantage to some of the exotic breeds is later onset of puberty. Heifers from these breeds generally reach a higher body weight and greater age before reaching puberty. In these breeds proper nutrition is of even greater importance than with the traditional British beef breeds.

ESTRUS CYCLE

The cow is polyestrous and ovulates spontaneously shortly after the end of estrus. A nonpregnant cow after

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puberty will generally exhibit heat every 17-24 days throughout her lifetime. The heat period will generally last from 10-26 hours and averages about 18 hours. Ovulation or shedding of the egg from the ovary usually occurs 4-16 hours after the end of heat.

The reproductive cycle of a cow is generally divided into four distinct phases: proestrus, estrus, metestrus and diestrus. Proestrus is the phase of the cycle just before the occurrence of heat. During this phase, the reproductive system is beginning preparation for ovulation of the egg and the potential embryo's development in the uterus.

During the heat period (estrus), the cow is sexually receptive and if mating occurs, peristaltic contractions of the reproductive system aid in transporting the sperm from the site of deposition in the vagina to the site of fertilization. Hormones secreted during this period affect the uterus and prepare it for the possibility of receiving the fertilized egg (embryo).

During metestrus in the cow or the period of time following sexual receptivity, ovulation occurs and the egg and sperm cells join and fertilization takes place. Hormonal action on the uterus continues preparation for receiving and nourishing the embryo.

Diestrus is characterized by continued secretion of the hormone progesterone. This hormone prevents the cow from coming into heat and is also primarily responsible for maintenance of pregnancy. If pregnancy occurs, the hormone, progesterone is secreted throughout the length of gestation in the cow. If pregnancy does not occur progesterone secretion declines about day 18 of the cycle and the cow goes into the period of proestrus again.

PREGNANCY AND PARTURITION

The length of pregnancy in the cow varies according to breed. Most beef breeds average about 285 days and dairy breeds about 282. Recently, the use of exotic breeds on domestic beef breeds has resulted in some apparent prolongation of pregnancy. Very little is known about the processes that initiate the birth of the calf. However, recent research indicates that hormones secreted by the adrenal gland of the calf may well initiate this process.

Parturition, the normal conclusion of pregnancy, has been divided into three stages (1) preparatory, (2) expulsion of the calf and (3) expulsion of the afterbirth. In the cow the prepartory stage averages 2-6 hours, the expulsion of the calf averages 0.5-1 hour and the expulsion of the afterbirth 4-5 hours. If the preparatory stage lasts more than 6-12 hours or the calf expulsion stage more than 2-3 hours then you can expect problems and assistance should be rendered. If gentle pulling does not result in birth of the calf, professional help should be contacted. Remember to use a good disinfectant and be as clean as possible to aid in prevention of infection.

Normally stage 3 of parturition, the expulsion of the placenta or afterbirth takes place within 24 hours following birth of the calf. In cases of abortion, premature birth, dystocia (difficult delivery) or multiple pregnancy, the placenta may not be expelled within a reasonable length of time (retained afterbirth). Generally, the recommendation to insert antibiotic boluses into the uterus and allow the placenta to be expelled by the cow is given. Physical removal of the placenta may result in damage to the attachment sites in the uterus with subsequent infertility.

Research work involving early induction of parturition by injection of certain steroid hormones is proving to have real potential. When breeding dates are known, then injections can be used to synchronize calving and to avoid the last few days growth of the calf that may cause calving problems. The induced calvings have generally been characterized by a high percentage of retained placentas. Treatment with antibiotics has proven to be effective in these cases and physical removal of the placenta has not been necessary.

REPRODUCTIVE EFFICIENCY

The cow has an extremely difficult job in terms of reproductive efficiency. She is required to produce a calf each year. If we consider that pregnancy lasts 280-285 days and 40-60 days is required after calving before the cow returns to heat, only a few days remain in a year for the cow to become pregnant to maintain a yearly calving interval. Some steps that can be taken to improve reproductive efficiency are: (1) shorten the breeding season, pregnancy test and cull open cows, (2) develop replacement heifers properly and breed them before the normal breeding season of the cow herd and (3) feed cattle adequately, particularly in terms of TDN or energy.

Shortening the Breeding Season

Length of the breeding season has a very direct effect on reproductive efficiency. If the breeding season is prolonged, individual cows in the herd may lose several days each year before the drift is noticed. The goal of the cowman should be to have every cow in the herd calve early in the calving season and produce a calf every year. Calves from these early calving cows will be heavier and more uniform at sale time. Cows calving later in the calving season are more likely to have poor conception because of less time for the reproductive system to be prepared for rebreeding. If the calving season is allowed to range from 90 to 150 days as in many instances, the cows calving late in the season may not be rebred before the bulls are taken out to prevent early heifer calves from being bred.

To prevent this problem allow a maximum 60 day breeding season and cull all open cows based on a

pregnancy test in the fall. The open cow will raise her current calf and be sold before winter feeding period begins. The pregnancy testing technique following a short breeding season rids the herd of boarder cows that do not produce a calf every year or at best produce a calf every 13-15 months.

Developing Replacement Heifers

Development of replacement heifers is very important in attaining reproductive efficiency. British heifers should be fed to gain at least 1 pound per day from weaning to breeding to insure early puberty and a high conception rate early in the breeding season. Heifers fed to gain 0.6 pounds per day in a test at Miles City, Montana achieved a 50% pregnancy rate compared to an 86% rate in heifers fed to gain 1.0 pound per day. Exotic heifers should gain 1.25 to 1.5 pound daily.

Heifers should also be bred at least 20 days before the rest of the cow herd. The heifer nursing her first calf then has three weeks longer to recycle and rebreed. Research has indicated that heifers calving early in the calving season continue to calve early and wean heavier calves throughout their lifetime. Heifers that calve late in the calving season tend to get later each year and will generally have a poor lifetime reproductive rate.

A recommended practice to maintain high reproductive efficiency is to breed 50% more heifers than actually needed and cull heifers that calve late in the season. Some of these heifers may not reach puberty and have to be culled because of nonbreeding.

Adequate Nutrition

Nutritional effects on reproductive efficiency can be drastic particularly in terms of getting cows to breed back after calving. A period of time is required for the uterus to involute and clean up before an adequate conception rate can be expected. After this time (approximately 40 days), assuming adequate nutrition, the cow should cycle and have two chances to settle before the 80 day postpartum period (during which she must breed to calve every year) is up.

A heifer should gain about 100 pounds during late pregnancy and then be fed to gain a pound a day following calving. Thirteen to sixteen pounds of TDN are required to continue the heifer's growth and maintain reproductive efficiency. Mature cows have more body reserves and are not growing, therefore they can withstand poorer treatment. Body weight must be maintained from fall to fall and weight gains of 150 pounds to calving and ½ pound per day from calving to rebreeding will result in good reproductive efficiency.

Poor nutrition of a beef herd will likely have lasting consequences. Many observations indicate that inadequate nutrition results in failure of the cow to recycle for as many as 100 days post partum. Cows will make up the weight loss from poor nutrition and produce milk for their calves before recycling. Apparently reproduction is one of the last body functions to return to normal following inadequate nutrition.

Breed Effects

Reproductive efficiency can be improved by the technique of crossbreeding. As much as 6-7% higher calf crops have been reported in herds of crossbred cows as compared to straightbreds. This difference is due to higher pregnancy rates and higher calf survival rates. Crossbred heifers also tend to reach puberty at a younger age than heifers of the parent breeds. These heifers reach puberty 35-40 days earlier than straightbreds mainly because of the inherrent increase in growth rate of the crossbred heifer.

There are breed differences in reproductive efficiency. Generally the British beef breeds are considered good and are similar. Some of the exotic breeds and some dairy breeds will require longer periods of time to reach puberty. Certain exotic and dairy breeds are noted for lower fertility and this will become important as crossbreeding programs are developed. Analysis of breeds going into a program must include fertility. Use of breeds that have fertility problems in a breeding program could be disastrous to reproductive efficiency.

SUMMARY

Reproductive physiology is the study of all that is involved in reproducing individuals of a species. Understanding of the reproductive cycle, pregnancy and the management techniques necessary to maintain reproductive efficiency are essential to a profitable beef production system. Techniques such as shortening the breeding season, pregnancy testing and culling of open cows, development of replacement heifers, maintaining adequate nutritional levels and paying attention to breeds involved in a breeding program are all essential to maintenance of reproductive efficiency. If every cow in the herd does not produce a calf every year, the reproductive efficiency is not as high as it can be. Strive for this goal.

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