REPRO TRACKS

by Cliff Lamb, Texas A&M University

Managing and Selecting Recipients for Embryo Transfer Success

Several key traits and characteristics create the ideal female for reproductive technologies.

The primary use of embryo transfer (ET) in cattle has been to amplify reproductive rates of valuable females. Ideally ET can be used to enhance genetic improvement and increase marketing opportunities with purebred cattle. ET is especially useful with cattle because of their relatively low reproductive rate and long generation interval. The success of ET depends on factors associated with the embryo, recipient and embryo transfer technician or an interaction among these factors.

Selecting recipients

Selection and identification of high-quality recipients is not simple. Many prefer the use of virgin heifers, whereas others choose cows with a known history of high fertility. When heifers are to be used as recipients, the selection criteria should be the same as for high-quality replacement heifers. Heifers need to be cycling, which can be assessed indirectly by using reproductive tract scores assigned based on the diameter and tone of the uterine horns. Heifers also need to be on a high plane of nutrition, have an adequately sized and normally shaped pelvic canal, and have no history of receiving growth implants.

Lactating recipients have an advantage of a known reproductive history. Since the health of the calf is dependent on the recipient, records should be kept of calf health and weaning performance. Recipients that carry an ET calf to term but do not raise a normal calf to weaning should be reevaluated as a recipient prospect.

Similarly, open cows with an unknown reproductive history need to be carefully examined prior to being included in a recipient herd or program. The reproductive tract needs to be thoroughly examined via rectal palpation or transrectal ultrasonography for pregnancy or uterine anomalies such as fluid or fetal remnants, evidence of metritis or endometritis, and the ovaries examined for normal follicular or luteal structures. In addition, recipients should have good teeth and eyes, a good udder, be less than 8 years of age, and be structurally sound.

Consider health

It is wise to keep the new arrivals separate from the breeding herd until sufficient time has elapsed for diagnostic screening tests to return and any incubating disease to become apparent. Many purebred producers and ET companies take blood samples to test for exposure to bovine leukosis virus (BLV), *Mycobacterium paratuberculosis* (Johne's disease), bovine viral diarrhea virus (BVDV), anaplasmosis and *Neospora caninum*. Brucellosis testing or vaccination is no longer required in many areas, but it is prudent to test cattle from areas where the disease is present.

Many of these pathogens have been associated with decreased fertility by preventing fertilization or by causing embryonic death, fetal loss or ovarian dysfunction. The use of vaccinations to control livestock diseases is a common and proven practice. Conventional recommendations suggest modified-live virus vaccines be given at least 30 days prior to breeding. Cattle with an unknown or questionable history of vaccination should receive primary and booster vaccinations at least 30 days prior to breeding.

Nutrition matters

A primary focus of an ET program

Continued on page 48

should be nutritional management of the recipients, since this is where the greatest expenses to an embryo transfer program occur. Insufficient intake of energy, protein, vitamins, and microminerals and macrominerals has been associated with suboptimal reproductive performance.

Of these nutritional effects on reproduction, energy balance is probably the most important nutritional factor related to poor reproductive function in cattle. Generally beef cows do not experience a period of negative energy balance, because they fail to produce the quantity of milk dairy cows produce. However, beef cows need to be in sufficient body condition to resume estrous cycles after parturition and overcome anestrus, short estrous cycles and uterine involution just to become pregnant every year.

Body condition score (BCS) is a reliable method for assessing the nutritional status of recipients. A visual BCS system developed for beef cattle uses a scale from 1 to 9, with 1 representing emaciated and 9 obese. A linear relationship exists between body weight change and BCS, where an approximate 90-pound (lb.) weight change is associated with each unit change in BCS.

Managers of recipients should understand when cows can be maintained on a decreasing plane of nutrition, when they should be maintained on an increasing plane of nutrition, or when they can be kept on a maintenance diet. Understanding the production cycle of the cow and how to manipulate the diet will improve the ability of the recipients to conceive to the transferred embryo.

BCS at calving has been shown to be a more predictable indicator of the duration of postpartum anestrus than prepartum change in either weight or BCS. When cows were thin at calving or had a BCS of 4 or less, increased postpartum level of energy increased the percentage of females exhibiting estrus during the breeding season. BCS at parturition and breeding are the dominant factors influencing pregnancy success, although body weight changes during late gestation modulate this effect. Altering poor body condition after parturition may reduce the negative effect on reproduction, but seldom overcomes or eliminates those negative effects.

The general belief is cows maintained on an increasing plane of nutrition prior to parturition usually have a shorter interval to their first ovulation than cows on a decreasing plane of nutrition. Energy restriction during the prepartum period results in a low BCS at calving, prolonged postpartum anestrus and a decrease in the percentage of cows exhibiting estrus during the breeding season.

Pregnancy rates and intervals from parturition to pregnancy are also affected by level of prepartum energy. Conversely, when prepartum nutrient restriction is followed by increased postpartum nutrient intake, the negative effect of prepartum nutrient restriction is partially overcome. The effectiveness of elevated postpartum nutrient intake, however, is dependent on the severity of prepartum nutrient restriction. The effect of BCS prior to calving also has implications for calf birth and weaning weights. Numerous studies document that increasing nutritional levels following parturition increases conception and pregnancy rates in beef cows.

Breeding season

A major influence on postpartum fertility is the length of the breeding season. Having a restricted breeding season has many advantages, such as a more uniform and older calf crop, but most importantly a breeding season of 60 days or fewer increases the percentage of females cycling during the subsequent breeding season. If the breeding season is shortened, then all cows have a higher probability for pregnancy during the next breeding season.

Strategic feeding to obtain ideal BCS can be achieved by understanding the production cycle of the cow. The period of greatest nutritional need occurs shortly after calving when a cow is required to produce milk for a growing calf, regain weight lost shortly before and after parturition, and repair her reproductive tract to become pregnant within three months after calving.

During this stage a cow is usually consuming as much feed as she can, and attempting to adjust BCS at this time often is futile. Cows are usually grazing and tend to consume their full protein, vitamin and mineral requirements. However, the grass is often lush with a high percentage of moisture which can occasionally cause a deficiency in energy. Therefore managing nutrition in recipients may be the single most important factor associated with the success of your ET program. AJ

Editor's note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station, Texas.