***Notes and News***

***From***

***Colorado Genetics, Inc.***

***2013***

As calving season is progressing this Spring, our newsletter again focuses on reviewing reproductive management practices, observations, technologies and suggestions that have been brought to our attention during the past year. Reproductive success in any beef cattle management program is often due to the attention given to small, and sometimes considered insignificant, details. Possibly our ideas and suggestions can assist you in developing a successful breeding program. Let’s hope for an “Agricultural spring Break “ with an abundance of rain!!!

For more subject details, we suggest you view our past newsletters on our website at [www.coloradogenetics.com](http://www.coloradogenetics.com) .

**EMBRYO TRANSFER AND ARTIFICIAL INSEMINATION**

* Inorganic versus organic trace mineral nutrition as recently reported by Dr. Cliff Lamb of the University of Florida, has shown that “feeding an organic mineral tended to increase the production of transferable embryos in purebred Angus heifers.”
* We have been using a new superovulation hormone for the last couple of years with very satisfactory results. Contact us about Stimufol.
* We are continuing to expand our foreign export market. If you have an international contact for your genetics, please call us for details.
* Re-synchronizing recipients is working well which offers the advantage of using a group of recipients twice in 28-30 days.
* A recent presentation entitled “Handling Frozen Semen and Embryos” was given by Dr. Brad Stroud of Stroud Veterinary Embryo Service.
* Dr. Stroud suggests that frozen semen handled by breeders and others, is four times more likely to be unacceptable for AI/ET than semen shipped directly from a bull stud after evaluating nearly 1000 shipments. It is emphasized that “once embryos or semen are frozen below 130⁰C (liquid nitrogen is -196⁰C) neither can be raised to temperatures without creating cell damage due to recrystallization.
* If this mistake is repeated over and over the damage is additive and continues to worsen. As little as 30 seconds of exposure in the upper portion of the tank neck can cause irreversible damage.
* Examples of tank temperatures:

|  |  |
| --- | --- |
| *Depth in Neck* | *Temperature (Celsius: ⁰C)* |
| 0 inches | +24.1 |
| -1 inches | +21.9 |
| -2 inches | +11.9 |
| -3 inches | -23.0 |
| -4 inches | -47.1 |
| -5 inches | -73.6 |
| -6 inches | -110.5 |
| -7 inches | -160.4 |
| -8 inches | -181.2 |

* Approximately 6 ½ inches (or 1-2 inches below the middle of the frost line) from the top of the tank is the required depth to maintain a **critical temperature** of -130⁰C or colder for maintaining semen quality!!
* Damaging exposure may occur when:
1. Receiving and transforming samples from a dry shipper to a wet tank
2. Thawing straws
3. Taking inventory
4. Preparing samples for shipment
5. Transferring straws from one cane to another
6. Be sure a dry shipper is cooled with liquid nitrogen overnight before shipping.
* According to Mr. Bryan Krick of CRI/Genex;
* The liquid nitrogen level in a tank is important. “As little as a drop in liquid nitrogen level of 4-5 inches can increase the temperature in a tank neck by almost 40⁰C.” Also, in a low nitrogen tank “the act of lowering a canister down (after removing straws) for re-cooling is inefficient and the temperature gradually increases in the frozen semen each time.”
* When moving frozen semen from a dry shipper to a liquid tank, the transfer should be completed in **3-5 seconds**!!
* Be sure the insemination gun is warmed (body temperature) before breeding, thaw at 95⁰F (35⁰C) for 30-45 seconds and move directly to the cow in 5-10 minutes.
* “Semen Straws exposed to temperatures above 100⁰ to 105⁰F or below 75⁰F after thawing can suffer sperm damage.”

**NUTRITION**

* At the Applied Reproduction meeting last December, Dr. Allen Bridges of the University of Minnesota remarked that “if cows receive inadequate energy or protein, they don’t get pregnant.” A fairly “cut and dried” statement! He continued by stating that insulin effects production of estradiol and decreased nutrition means lower levels of insulin production and therefore, lower fertility. Inadequate nutrition can reduce production of insulin-like growth factor -1 (IGF-1) and leptin. IGF-1 plays a role in cell growth and leptin is associated with both insulin and IGF-1 production. “Too much nutrition (fat cows) with very high BCS means too much insulin and results in the same decreased fertility.”
* Dr. George Perry of South Dakota State University again reminds producers to avoid preparing heifers for breeding with a feedlot environment and then being turned out to pasture (often too early, very green “washy” grass) after AI or ET. This usually causes a weight loss and embryo survival may be jeopardized possibly up to 15-20%. “The heifers should not go through a period of negative energy intake.” At CGI, we also know from past experience, that this management practice for ET recipients has also reduced pregnancy rates.
* Remember, adequate protein in a ration, or supplemented protein, requires corresponding levels of energy to be properly digested and utilized by the cow.
* Dr. Rick Funston of the University of Nebraska commented that “maternal nutrition influences fetal organ and muscle development, postnatal calf performance, carcass characteristics and future reproduction of the calf.”
* Poorer quality forages require an addition of protein to increase intake and digestibility. Crops from drought areas need to be tested for energy, protein and potentially toxic levels of some minerals. One client this last fall lost 20 head overnight from hay containing toxic levels of nitrates!
* To decrease loss of expensive hay, a cone-style feeder with a metal bottom can reduce loss to about 5-6% as compared to 20% with a ring feeder. Also, feeding Rumensin (at approximately $0.02/cow/day) can increase hay digestibility and net energy value of low quality hay. We also have clients using the Crystalyx tubs for protein supplementation and for reproduction on poor quality forage.
* Feed cows to requirements, often called “limit feeding”, to save on feed. A dry, pregnant cow can eat up to 15-20% more hay than she needs if allowed free access!
* Because a first calf heifer does not consume as much feed as a mature cow, Rick Rasby of the University of Nebraska indicates “the ratio of energy and protein in the diet needs to be higher.” He recommends that these heifers “post calving need to consume a diet that is at least 62% total digestible nutrients and 10 to 11% crude protein.”
* As several studies in recent years have shown, replacement heifers can weigh less at first breeding than previously thought. An article in the Journal of Animal Science reports a group of Angus based heifers were assigned to a low forage diet to consume 3.5% of body weight (BW) or to a high-forage diet to eat 7% of BW. At breeding the groups weighted 759 lbs. (low) and 796 lbs. (high) but there were no differences in AI pregnancy rates or total overall pregnancy rates following clean-up bulls. Slower gains early in development did not appear to decrease reproductive performance.

**Genetics of Reproduction**

* Dr. Robert Cushman of US Meat Animal Research Center (USMARC) in Nebraska spoke at the Applied Reproductive Strategies in Beef Cattle meeting recently held in Sioux Falls, South Dakota. Dr. Cushman made the following statements:
* It has been well known that reproductive traits are considered lowly heritable as “they are polygenic, meaning many genes have small effects.” In other words, genetic selection has less impact than environmental effects or general management. Reproductive tract scores (RTS) and age at first detectable progesterone (cyclicity) are at the top of the heritability ratings. RTS provides a way to analyze reproductive development.

Estrous response percentage as related to RTS:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1 = 54% | 2 = 62% | 3 = 76% | 4 = 83% | 5 = 86% |

* “We don’t know that in stacking genes for productive traits we won’t negatively impact fertility.” Note, caution may be needed when producers continue to adopt the use of genetic markers for production traits.
	+ “Differences in ovarian morphology exist at birth”, Cushman states, “and heifer development starts when the undifferentiated gonad (ovary) actually starts to turn her into a female.” Note: reports indicate a heifer is born with 100 to 250,000 total ova!
	+ Continued research by Dr. Cushman using ultrasound to assess the antral follicle count (AFC) of the ovaries may provide a future means to determine heifers that may have subsequent increased pregnancy rates.
	+ Research at USMARC has indicated that repeat breeder cows have fewer ovarian follicles. “There was no difference in age at first breeding, but the repeat breeders were about 40 days older at first calving and ovaries and uterine horns were smaller.”
* In regard to genetic selection, Dr. Bob Weaber at Kansas State University reminds producers that “calving-ease scores are a better selection tool than birth weights alone.” “Calving ease, rather than birth weight is the economically relevant trait associated with dystocia.”

**REPRODUCTIVE MANAGEMENT**

* Dr. Bob Larson of Kansas State University speaks of creating “reproductive momentum” with the goal to get cows and heifers bred early, calve on time and re-breed to calve on time in the future. Spring calving cows may require both protein and energy supplementation, especially with low-quality forage, to reach a body condition score (BCS) of 5 to 6 for rebreeding effectively. With first calf heifers, he recommends a BCS of 6 at calving in order to not be “catching up” nutritionally after lactation begins which can delay the onset of postpartum estrus. Yearling heifers “require supplementation to meet weight gain goals in most forage conditions.” Target body weight is generally 55-60% of mature body weight (based on a 1300 pound cow) with a BCS of 6 at the onset of breeding. Puberty in beef heifers requires both weight (as determined above) and age of approximately 12-14 months old.
* As a consultant, Mr. Burke Teichert recently wrote of his three points for herd reproduction:
	+ Develop heifers to breed earlier which makes them better cows in the future.
	+ Slowly develop a program over a few years to eventually expose heifers to breeding for a very short time of 24-30 days for herd replacement.
	+ Begin to work toward a 30-45 day calving season by selling late-calving cows as pairs after calving.
* Dr. Eric Mousel of Northwest Missouri State University, noted that “from the standpoint of profitability, heifers that calve in the first 21 days of the calving season may represent as much as 75% of future income.”
* At a recent meeting, Dr. Al Barth from the University of Saskatchewan Veterinary College, stated that he believes that “researchers have overlooked a very important period of managing development in a bull’s lifetime – calfhood.” “There are indications of a strong effect of calfhood nutrition and health on age at puberty and testis size, implying earlier maturity and larger lifetime testis size and that optimizing bull fertility should focus on the time bull calves are still nursing as it is likely that final testis size is determined before weaning.”
* Timing of AI still remains to be approximately 12 hours after first standing heat to allow for sperm capacitation (4-6 hours) in order to be prepared to fertilize the ova (egg) that is released from the ovary (ovulation) about 25 to 30 hours after first standing heat. Sperm may remain viable for up to 30 hours in the reproductive tract but the ova may only be “fertilizable” for 6-10 hours so timing is important.
* Remember to place the semen for AI **into** the body of the uterus – not the cervix!! The bull may ejaculate up to 8 billion sperm cells but you are only working with 12-20 million so placement is crucial.
* It is estimated that nearly 95 to 100% of natural mating will result in fertilization of an embryo but up to 30% may be lost by day 14 of pregnancy with another loss of 5 to 10% by day 42. This early embryonic death (EED) is considered unavoidable due to genetic complexities.
* In a recent article by Dr. Bill Beal of Virginia Tech, he wrote that “the results of the genomic tests are not likely to replace the measurement of scrotal circumference (SC) but will enhance the accuracy of the genetic predictions.” Minimal recommended SC still remains 30 to 34 centimeters (cm) for most beef bulls from 12 to 24 months of age.
* The calving season is often said to start when the third mature cow calves. The overall reproductive success of a herd can be calculated as a percentage of cows pregnant and percentage of cows calving. Also, a calving distribution can simply be assessed by recording the percentage of calves born in 21 days, 42 days or 63 days plus from the start of calving to compare to past or future herd reproductive records.

**ESTRUS SYNCHRONIZATION**

* Although estrus (heat) synchronization protocols have changed over the past years, the basic underlying physiological principles have remained the same. Constant research and data recorded has simply been used to “fine tune” the bovine reproductive system.
* Many reports now continue to show that the incorporation of timed AI (TAI) programs early in the breeding season will enhance reproductive performance of suckled beef cows particularly with a greater percentage calving in the first 21 days and a higher percentage of weaned calves. Regardless of protocol, it has been estimated that there is an advantage of about $49.00 per cow exposed to TAI.
* In heifers, Dr. Patterson of the University of Missouri recently compared a 14 day MGA program to the 14 day CIDR-PG protocol, and found that “there was a significant improvement in estrous response and synchrony of estrous” with the 14 day CIDR-PG schedule. He also noted that A.I.’ing on heat detection prior to TAI did increase pregnancy rates. Our clients now tend to use the 14 day CIDR-PG or the 7 day CO-Synch + CIDR protocols for TAI of heifers.
* In beef cows, the two most commonly used protocols are the 7 day CO-Synch + CIDR and the 5 day CO-Synch + CIDR. Dr. Lamb of the University of Florida indicates the 5 day program tends to show a 3% to 5% increase in pregnancy rate but remember the second prostaglandin (PG) injection **must be given at least 8 hours after CIDR removal** so it requires an extra time through the chute compared to the 7 day program.
* Note that intramuscular (IM) injection of PG or gonadotropin releasing hormone (GNRH) in the neck region does not alter the effectiveness of synchronization protocols.
* TAI vs. heat detection breeding has been explained as follows:
	+ 100 cows bred on TAI x 55% conception = 55 AI calves
	+ 100 cows x 85% heat detected x 65% conception = 55 AI calves
* Producers may begin to consider using female sexed semen, particularly with heifers, in anticipation of herd rebuilding in 2014 and 2015 if environmental and economic conditions become favorable.
* Mr. John Moes of South Dakota indicates from a commercial producer’s perspective, “since implementing estrous-synch protocols, his operation has improved conception rates, increased longevity, produced more uniform cattle and increased overall quality”.
* When cows/heifers in an estrous synch program do not show heat but are bred at TAI with an injection of GNRH, ovulation is then induced to occur approximately 25-30 hours later which explains some females becoming pregnant without showing visible signs of estrous.

**BODY CONDITION SCORE (BCS)**

* BCS is rated on a scale of 1 to 9 with 1 being emaciated and 9 refers to very fat. The difference between one score and the next is considered to be in 100 pound increments.
* Brief BCS definitions:
	+ Thin - BCS 3: beginning fat cover over loin, back and fore ribs. Backbone still highly visible and identified by touch. Ribs are individually identified.
	+ Borderline - BCS 4: individual ribs not visible except for the 12th and 13th rib. Backbones can be identified individually, but feel rounded rather than sharp. Some fat over ribs and hip bones.
	+ Moderate – BCS 5: generally good overall appearance. Backbone not visible and feel rounded. Tail head area is filled but not rounded.
	+ Good – BCS 6: ribs fully covered and not visible. Firm pressure needed to feel the backbone. Hind quarters plump and full.
	+ Very Good – BCS 7: fat covers on either side of tail head. Backbone felt only with firm pressure. Cow appears “fleshy”.
* Calves receive more volume of colostrum and more antibodies as the cow’s BCS goes up.
* Scoring clinics have been held and results show that many producers miss the cow weights by 200-300 pounds and missed BCS by two full scores.
* Reproductively, Dr. Lamb reports that results from studied TAI projects indicate the following in regard to BCS and corresponding pregnancy rates:
	+ BCS less than 4.5 leads to approximately a 30% pregnancy rate
	+ BCS of 5 leads to approximately 45 to 50% pregnancy rate
	+ BCS 5 to 6.5 leads to approximately 70% pregnancy rate

**MINERALS**

* Sulphur is needed to make specific amino acids in cattle but in excess it can interfere with copper, zinc, calcium and selenium availability in the rumen. Remember, feeding large amounts of distiller grains can lead to excess sulfur in the ration.
* Some notes from a recent presentation by Mr. Cody Wright of South Dakota State University:
	+ Phosphorus (P) supplementation may need to be included in response to drought conditions to maintain adequate calcium (Ca):P ratios. Distiller grains are a good source of Phosphorus.
	+ Copper (Cu) deficiency can adversely affect estrus expression and is possibly the most common concern in many western states. (Our past experiences with Cu deficiencies have resulted in lowered ET and AI results.)
	+ Iodine (I) deficiency can lead to poor conception rates in cows and decreased semen quality in bulls that can usually be solved with iodized salt.
	+ Manganese (Mn) has been associated with corpus luteum (ovarian CL) function and synthesis of sex hormones and deficiencies can result in irregular heat (estrus) cycles and reduced conception rates.
	+ Selenium (Se) deficiency has been related to reduced immune function, decreased semen viability, white muscle disease and endometritis (uterine infection).
	+ Zinc (Zn) deficiency is often associated with reduced testicular development, semen quality and libido in bulls. Supplementation can result in an increase in ejaculate volume, sperm concentration, percent of live sperm and percent motility.
	+ As a note, research suggests that “sulphate and chloride forms of various minerals are the most bioavailable followed by carbonates and oxides as the least.” Chelate organic minerals are the best utilized by cattle and over the past 25-30 years we have often recommended the Albion Cattle Breeder Pac or VitaFerm Concept Aid. Both are reproductive minerals and MultiMin is still a supplement to continue to use at breeding.
* It is important that a pregnant cow receives proper mineral supplementation to insure the fetal liver has stored specific minerals because milk does not provide adequate supplies of copper, iron, zinc and selenium to meet requirements early in life. Vitamins A and E are contained in the colostrum.
* *Multimin 90* is a subcutaneous (SQ) injectable form of the trace minerals zinc (Zn), manganese (Mn), copper (Cu) and selenium (Se). As in the past years, at CGI all of our breeding protocols include Multimin for each female, i.e., ET donor, recipient and AI cow/heifer. Research data does show increased pregnancy rates with Multimin use. More of our clients are including the product for calves at birth and at pre-conditioning prior to weaning in order to enhance the immune response for vaccinations given. These clients have reported healthier calves and true return on investment.
* A Kansas State University study indicates injecting Multimin 90 at pregnancy test and 30 days prior to breeding showed a benefit to TAI pregnancy rates of 60.2% vs. 51.2% for control cows not receiving the Multimin 90.
* Data from a University of Florida study shows “that the concurrent application of Multimin and modified live viral vaccines increased the production of neutralizing antibody titers against IBR virus significantly in beef steers as early as 14 days after vaccination and maintaining a difference up to 60 days post vaccination.”
* Since sperm production requires about 65 -70 days to be completed in a bull, it is recommended that bulls receive a Multimin 90 injection at least 90 days prior to semen collection or breeding.

**VACCINATIONS**

* Dr. Chris Chase of South Dakota State University gave a presentation titled “Maximize a Vaccination Program”. As with many reproductive factors, “immune responses to vaccinations require animals to be in an increasing plane of nutrition with a positive energy balance.” In order of importance, he quotes “energy, protein, vitamins A and E, copper, zinc, selenium and iron” in attaining an adequate response.
* A report issued in February 2013 by the South Dakota State University titled “The effects of vaccination and serum hormone concentrations and conception rates in synchronized naïve beef heifers” discussed heifers that were vaccinated with a modified live virus (MLV) herpes virus vaccine at the time of synchronization. In short, the heifers had an increase in abnormal estrus cycles, a decrease in estrogen levels (required for a fertile heat), a decrease in progesterone concentrations (required to maintain pregnancy) and a decreased pregnancy rate as compared to controls. Remember, pre-breeding vaccinations need to be given **30 days or** **more before** breeding!
* Visit with your veterinarian if you have concerns about using MLV or inactivated (killed) reproductive vaccines in pregnant cows. Always remember to follow the specific instructions for the vaccine so you are “on-label”.

**ODDS & ENDS**

* All colostrum certainly may not be equal from cow to cow or within a herd. At CGI we have gathered information on some colostrum supplements that may be of interest.
* Research of feed efficiency in cattle continues to show the trait to be very economically significant and it is highly heritable.
* Cattle Fax 2013 predictions: fed cattle averaging $128/cwt, 750 pound steers averaging $166, 550 pound calves averaging $185 and beef cutouts at $196 – all above 2012 prices.
* On 20 February 2013 the Ag Secretary announced that the USA has received a “negligible risk” classification for BSE from the World Organization for Animal Health (O.I.E.).
* From a reproductive standpoint, eliminate all heifers for breeding that have received growth-promoting implants as insurance against impaired uterine development and reduced pregnancy rates.
* Recent approval of a new extended-release de-wormer labeled “Longrange” is said to offer parasite control up to 100-150 days.
* Dr. Thundathil of the University of Calgary states the most common cause of abnormal sperm production in bulls include increased heat, frostbite and excessive fat deposits of the scrotum as well as infections, stress and expression of deleterious genes.