

The objective in feeding animals is to supply through the diet, the appropriate amounts of energy and amino acids to match maintenance requirements, then the productive demands of lean tissue deposition, milk or wool production. The body of an animal uses dietary nutrients in a priority fashion. Maintenance functions are met first, then growth elements followed by productive purposes. In open grazing circumstances forage supply both reduces under heavy stocking rates and declines in nutritive value as NDF increases towards fall. This changes the concentration of nutrients entering the rumen and could create nutrient shortfalls if sufficient amounts of pasture forage are not available. Adding higher quality forages and grain can alleviate these deficiencies. By watching body condition score (BCS) we can estimate nutritional sufficiency.

Shorting the nutrition program of the gestating female can have profound effects reaching far beyond the dam and her ability to be rebred to impact the health and growth of the offspring. Animals that consistently consume below their safe nutrient needs experience an adaptation. Their internal organs increase in size so as to be able get more from what they eat. This effectively increases their maintenance requirements further reducing available nutrients for productive purposes. Over long periods of time this is often accompanied by a loss of body condition. We hope to avoid this decline as it also leads to nutritional or maternal programming of the offspring. Nutritional programming is defined as “changes in the intrauterine environment during gestation that can negatively impact embryonic and fetal development resulting in alterations to organ function, tissue development, and metabolism which can have long-lasting, detrimental effects on the offspring (Barker and Clark, 1997; Petry et al., 2001; Barker, 2004, 2007; Wu et al., 2006), Maria L. Hoffman PhD Thesis U. of Connecticut 2014”. By altering the balance between animal growth, muscle development, and carcass adiposity, maternal programming is a threat to livestock operation efficiency and profitability. Several maternal factors can have a programming effect on offspring development. These factors include but are not limited to, uterine capacity, exposure to disease, stress, and maternal diet composition (Wu et al., 2006). Of these factors, recent research interests have focused on the effects of poor maternal nutrition on offspring as altered nutritional status during pregnancy frequently occurs in livestock production operations. Regardless of timing of maternal nutrient restriction, it leads to reduced BW and reduced early postnatal growth. It was determined that offspring born to under- and over-fed ewes exhibited persistent alterations to body weight as well as organ mass, back fat measurements, and loin eye area as determined at necropsy.

BCS is important because it is a visual clue to what is happening nutritionally. Prolonged nutrient restriction below maintenance needs has more negative consequences than positive ones. In simple terms it saves money by lowering feed cost and there is an associated labour reduction but over longer stretches animals adapt with negative impacts on offspring and ultimately income.

Feeding forages to support the potential shortfall is the best way to prevent loss of BCS in cattle or sheep. Feeding all the animals may not be necessary so ways to segregate the herd are valuable management techniques in addressing the bottom twenty five percent of the herd which generally has the most difficulty in competing. Not all farms have the infrastructure to be able to separate out the

animals that are sliding in BCS and this is the area of greatest need in facilities design. Manual separation of animals is not always practical but the use of electronic gates and RFID readers is simple and cost effective and will become part of modern herd management moving forward. This dramatically reduces the cost of feeding related to BCS and delivers good production and economic results avoiding negative adaptations in the herd. Results from sheep herds that adapted electronic segregation and group specific feeding paid for the equipment cost quickly through not having to increase feeding to the entire herd, and reduced mortalities and illness of dams and offspring.

The goal in supplemental feeding is to get good intake from available forage and minimize waste. This year we have abundant supplies but weather events reduced this quality. Highline Bale processors have demonstrated their value in chopping forages consistently into the theoretically ideal cut length getting maximum intake in cattle as compared to long hay. Chopping medium and lower quality hay and straw increases net intake of nutrients on a daily basis. For maintenance of gestating cattle and sheep, energy is the main concern for deficiency. We want to avoid both over and under feeding to get maximum benefit of a feeding program. This is where the Highline Bale Pro excels in delivering specific weights of forage and grain in the amount the animal needs without letting the animal sort its way to a nutritional imbalance. Highline has conducted in house studies to demonstrate the ability of the Bale Pro models, equipped with a chopper and grain tank, using its multiple aggression settings to adjust the feeding rate on a per animal basis with all forage types perfectly chopped and homogenized to encourage maximize intake. These design features take advantage of an animal's natural instinct to search out smaller lengths of forage which promote rumen health and the mixing action of the chopper homogenizes all smaller particles into the windrow to minimize both over consumption and loss on the ground. It is always recommended to feed in bunks to minimize feed waste as they pay for their cost quickly in what they save.

Forages constitute the majority of feed that is fed to the cow herd and all feed represents about 35% to 40% of the total for operating costs. Operating costs are generally sixty-five percent of total annual costs so this is a big area to look to for efficiencies. This should not be a cost cutting exercise only but a search for ways to get more from resources already being expended.

So, let's take a look at an example of a mature cow on the pasture this year in Saskatchewan. She is seven years old and her body has been through many seasons of feasts and famines and knows the signals to send to prepare her body to survive. Through the summer, pastures were lush and the developing calf got the benefit. At the embryonic stage high levels of DNA coding are underway reacting to environmental signals sent by the cow. The cow's body is constantly sensing nutritional competence and environmental signals and reacting through DNA expression. Early signals told her body all is good and to continue developing the calf normally. Through the fall her pasture became thin through overgrazing and nutrient supply became restricted. This was visible by watching body condition score drop from 3 to 2.5 or 2. This indicates a longer term shortfall of 30 days or more and if not addressed will cause alarm signals in the body of the cow. Physiologically the cow's survival mechanisms reduced nutrients to any area that is not necessary for survival. Since reproduction is not necessary for survival the offspring experiences reduced nutrients from the placenta. Early snow this year on top of deficient nutrient intake from pasture pressured the cow and developing calf even more. Difficulties in getting to

the cow herd with supplementary feed and the inconsistent supply caused stress alerts in the cow. These environmental and nutritional conditions are interpreted by the cow's body as a danger to survival and so she reacts by downregulating nutrient flow to the growing calf. Her calf is now coded for poorer health and growth. By now, in November, we see extended grazing continuing with supplementary feeding beginning in some herds but not all herds that need extra feed. While this restores the nutrient intake and begins to rebuild body condition the impact of an extended shortfall is still expressed in the calf in some measure. These show themselves as health issues often related to the respiratory and circulatory systems. To delay feeding where nutrients are inadequate is false accounting because it will show up in reduced performance and possibly higher mortality in the offspring. The CFR Bale Pros allow the operator to accurately deliver nutrients without a shortfall or an excess and in the best cut length allowing the best possible body condition in the cow and the best chance for optimum genetic expression in the calf.