## Body Condition Scoring and Energy Balance

Body condition scoring is used to help dairy producers better manage energy balance in their cows. Energy balance (EB) is the difference between energy consumed and energy expended. Early lactation dairy cows are not able to consume enough feed to meet their energy needs for maintenance plus milk production and are said to be in negative energy balance (NEB). For example a cow producing 50 kg of milk, at 30 days in milk, might consume enough feed to provide 39.7 Mcal NEl (net energy of lactation). However, 45.2 Mcal NEl are expended for maintenance plus milk production, resulting in an energy balance of –5.5 Mcal NEl (39.7 – 45.2 = -5.5). This cow is in NEB. The cow must make up this energy deficit by using body fat as an energy source and as a consequence will lose body condition in the process. In this example the cow would loose 1 BCS in approximately 70 days. This period of energy deficit is normal, however if EB becomes too negative or is negative for an extended period of time, milk production can be reduced, health problems increased and reproduction impaired. It is not possible to measure energy balance under farm conditions but measuring and managing body condition is possible.

## Body Condition Scoring Systems

The first body condition scoring system was developed for sheep because producers could not determine how fat or thin a ewe was when she was in fleece. The manual palpation method for determining BCS was developed to overcome this problem. This system was later adapted for use with beef and dairy cattle.

There are 2 body condition scoring systems in common use in North America. The one presented here was developed by Wildman and coworkers (1982) at Virginia Polytechnic Institute and State University and relies on manual palpation of the animal to determine the BCS. The other system in common use is based on visual observation to determine BCS and was developed for use in large herds where the “hands-on” approach is not practical. Both systems use a 1 to 5 rating with BCS 1 animals being extremely thin and BCS 5 being extremely fat. Both systems will assign the same BCS to a given animal.

## Target condition scores

Ideal condition score depends on the stage of the production cycle and on the level of milk production and is not a single value but is a range. Workers at Pennsylvania State University have developed a set of guidelines.

At dry off, cows should have attained the target BCS and this should be maintained until calving. From calving to 120 days in milk (DIM) BCS loss will normally be 0.5 to 1 unit of BCS. Cows should not lose more than 1 BCS at any time. During mid-lactation, BCS may remain constant or begin to increase slowly. The late lactation period is normally when cows completely replenish the BCS lost in early lactation. Cows utilize dietary energy for weight gain at 75% efficiency when they are milking compared to 60% efficiency when dry. Therefore increasing BCS in the late lactation period is easier and less expensive than trying to increase it during the dry period. However, the dry period

can be used to replenish body condition if necessary. Cows that are over-conditioned (BCS > 3.75) should not be fed to lose condition during the dry period.:

| Stage of production cycle | Ideal Score | Range |
|---|---|---|
| Dry off | 3.50 | 3.25-3.75 |
| Calving | 3.50 | 3.25-3.75 |
| Early lactation | 3.00 | 2.50-3.25 |
| Mid-lactation | 3.25 | 2.75-3.25 |
| Late lactation | 3.50 | 3.00-3.50 |
| Growing heifers | 3.00 | 2.75-3.25 |
| Heifers at calving | 3.50 | 3.25-3.75 |

Source: Byers, 1999

**BCS and Milk Production**

The modern dairy cow cannot consume enough feed in early lactation to provide her with enough energy to meet her needs for maintenance and milk production. Under these circumstances, the cow mobilizes body fat to be used to supply the needed energy and as a result, loses body condition. Research has demonstrated a 2 to 3 kg increase in daily milk production during the first 120 day in milk in cows using body fat (loss of 1 BCS) to support milk production. This suggests that peak milk production was increased by 2 to 3 kg. Whole lactation milk production increases by approximately 200 kg for each 1 kg increase in peak milk production, therefore a 2 to 3 kg increase in peak made possible by utilizing body fat would result in 400 to 600 kg more milk during the entire lactation. Field observations suggests that cows that are too thin at calving (BCS < 3.25) may have insufficient body reserves to support normal peaks or may exhibit a loss of persistency in milk production. In either case, whole lactation milk production suffers.

**BCS and Reproduction**

Research indicates that cows that are too fat at calving (BCS >4), were more prone to reproductive diseases such as difficult calving, retained afterbirth, cystic ovaries and uterine infections than cows with lower BCS. Cows that lose more than 1 BCS experience reduced fertility, which may be more pronounced if the BCS loss is rapid. Reproduction has been shown to be unaffected by BCS loss of up to 0.5 units. Cows losing more than 0.5 units of BCS have been observed to suffer some impairment in reproduction. Excessive BCS loss (>1 BCS) or too rapid a loss usually results in greater impairment. The usual observed impairment in reproduction is a longer interval to the sussceeful establishment of pregnancy..

## BCS and Health

Overconditioned cows (BCS 4 and above), are more likely to experience one or more metabolic diseases around calving. Increased incidence of subclinical ketosis and displaced abomasum have been observed in experiments with over-conditioned cows. Over conditioned cows often have low feed intake after calving resulting in a rapid mobilization of stored body fat needed as an energy source to support milk production. This can result in excessive accumulation of fat in the liver leading to a condition known as fatty liver syndrome. Ketosis, increased susceptibility to disease, delayed return to estrus and reduced fertility can result.

## BCS and Body Weight

One unit of BCS is equivalent to 56 kg of live tissue weight. The approximate composition of this tissue is; 70% fat, 24% water, 6% protein and 1% mineral (Otto and co-workers, 1991).

## Assigning a Body Condition Score

Often an animal being evaluated does not meet the exact criteria of a given BCS but falls somewhere between 2 BCS. The evaluator must decide if the animal is half way between the 2 scores in which case a half score can be assigned. If the animal is not quite “half’ way between, then a quarter score can be assigned. For example a cow scoring between a BCS of 2 and a BCS of 3 may be scored as a BCS 2.5, if the cow is half way between a 2 and a 3. If the cow is not half way between but is closer to a BCS 2, then a BCS of 2.25 can be assigned.

**Helpful Hints**

To help evaluators zero-in on the BCS, workers at Pennsylvania State University have developed some useful guidelines that are outlined in the table below:

| **Decision 1** | | **Appearance of the Rump (backbone, thurl, pin bone)** | |
|---|---|---|---|
| | | "**U**" shaped | |
| | | **Yes** | |
| | **BCS** | **Sacral ligament** | **Coccygeal ligament** |
| | 4.00 | Buried in fat (flat) | Buried in fat |
| "Too fat" | 3.75 | Partially visible | Invisible, buried in fat |
| | 3.50 | Visible | Partially visible |
| | 3.25 | Visible | Visible |
| **Decision 2** | | **Appearance of rump (hook bone, thurl, pin bone)** | |
| | | **"V"** shaped | |
| | **BCS** | **Yes** | |
| | | **Hook bones** | **Pin bones** |
| | 3.00 | Round (fat pad) | Round (fat pad) |
| | 2.75 | Angular | Round |
| | 2.50 | Angular | Angular (palpable fat pad) |
| "Too thin" | <2.50 | Angular | Angular (skin and bone) |

Source: Ferguson, 1996, cited by Byers, 1999.