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Compensatory Gain in Cattle

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Nutrient Restriction

Compensatory gain is defined as a faster than normal rate of gain after a period of feed restriction. It typically occurs in cattle that have been previously restricted or maintained on a low plane of nutrition. The severity and duration of feed restriction affects an animal's ability to compensate.

Inadequate forage availability for grazing cattle along with supplementation rates that do not meet cattle nutrient intake needs can result in cattle growth restriction. In these situations, cattle simply do not get enough to eat. Similarly, use of poor quality forages and feeds in terms of nutrient content can also inhibit cattle growth rates. In this case, cattle are offered all that they can eat, but the nutrient content of the forages and feeds available to them is not sufficient to meet their requirements for bodily functions including maintenance and growth. Therefore, it is important to provide both adequate quantities of forages and feeds to cattle and to make sure that these feedstuffs contain sufficient nutrient levels (are of acceptable quality).

Cattle that do not consume a diet sufficient for meeting maintenance needs will lose weight and productive functions such as growth, lactation, and reproduction will be sacrificed. Cattle may, on the other hand, consume a diet that meets their maintenance needs but does not provide adequate nutrients for acceptable performance of these other functions. In this case, an animal may grow but at a slower than optimum rate.

Compensatory Growth

Compensatory gain occurs when nutrient intakes return to sufficient levels. It can be triggered after relatively short periods of nutrient restriction. Growth compensation may happen due to enhanced forage or feed intake. Grazing or feeding systems that produce excellent gains provide an opportunity for compensatory growth.

Compensatory growth responses as well as feed efficiency response to compensatory gain are highly variable. This is important when developing breeding stock such as heifers to target weights. If initial heifer growth rates are restricted, then increased rates of gain must be achieved later to meet development targets. Larger growth deficits to overcome and shorter remaining periods in the development process increase the risk of not meeting development targets. With variable compensatory growth responses among animals, nutritional planning and management become more difficult.

There are limits to compensatory gains. Cattle may initially compensate but later grow at similar rates to peers that did not undergo nutrient restriction. For example, compensatory gains might occur during an initial stockering period but not continue into subsequent stockering or finishing periods. In addition, longer periods of nutrient

restriction reduce compensatory gain potential. An animal that has been on a slow-growth nutritional program for an extended period of time or severe nutrient restriction for even a short period of time may not be able to meet its genetic potential for weight. These “stunted” or “mismanaged” animals may develop out to a smaller mature size or final product weight. With seedstock cattle, this biases performance data and gives an inaccurate depiction of genetic potential.

Compensation is not necessarily 100%, so some weight potential is lost as a result of nutrient restriction. Cattle may fail to completely make up for lost gains, despite compensatory gains. Nebraska stocker cattle studies showed a range in growth compensation rates from 19 to 88%. The number of days of nutrient restriction appeared to affect compensation percentages with longer restrictions reducing compensatory gains. Also, as cattle increase in weight, they may have reduced ability to compensate for lost growth.

Economics of Gains

Rate of gain affects both animal performance and profitability of various production phases. Nebraska research showed that restricting stocker gains over the winter to 0.5 to 1.0 pounds per day resulted in 25 to 32% compensation afterwards on grazing compared to cattle not restricted over the winter gaining pounds per day. When cattle were compared after finishing, the steers wintered with a “fast” rate of gain profited $28.85 per head whereas the steers wintered with a “slow” rate of gain lost $30.24 per head. Additional research found that yearling cattle wintered at a “slow” rate of gain responded less to bypass protein supplementation in summer that yearlings wintered at a “fast” rate of gain. This suggests that previous plane of nutrition affects nutrient utilization at later production stages.

Consider compensatory gain potential when valuing cattle. The value of compensatory gain post weaning can be significant. Thin cattle often have some level of compensatory gain potential post-weaning. In addition, thin cattle may have underlying health problems or poor genetic potential that limits future compensatory gain. Fleshier calves, on the other hand, may exhibit little or no compensatory gain in stockering or finishing systems and may be discounted because of this prospect.

The challenge in valuing compensatory gain potential is that it is variable and difficult to predict. Caution is warranted in purchasing cattle to exploit compensatory gain due to the frequent high variability of expected cattle growth performance. Be sure to factor in any potential effects of previous plane of nutrition on carcass traits when retaining ownership through finishing and marketing on a grid basis. Low rates of gain can lower Quality Grade and carcass weight.

Optimum rate of gain is the highest value of gain. This considers both cost of gain and value of product as a result of gains. Optimum average daily gain is not necessarily the rate of gain producing lowest cost of gain. Nor is it always the rate of gain producing the highest product value. The value of gain can be calculated as follows:

Value of Gain = (Gross value of animal sold – Gross cost of gain) / Pounds of Gain

Because the cost of gain can vary over time and with the use of different production inputs, the timing of compensatory gains becomes important economically. The degree of compensation is also critical primarily due to its influence on product value. The value of product as a result of gains includes the value of additional gains and any changes in the total value per unit of product. If price per pound goes down as a calf gets heavier, then the product value reflects the additional weight and the lower price per unit of weight.

Understanding why cattle growth rates vary, what to expect during and after periods of nutrient restriction, what cattle nutrient levels are needed to achieve production targets, and how growth rate variation impacts production economics is essential for cattle purchasing, management, and marketing decisions. Nutrient restriction and ensuing compensatory gains is a complex issue that can greatly impact production scenarios. For more information about beef cattle production, contact an office of the Mississippi State University Extension Service.