

More with Less

Milk energy's role in beef cow efficiency.

by *David Lalman and Sam Talley*

A simple definition of an efficient cow is one that calves early and weans a big, healthy calf every year without requiring an excessive amount of forage or supplemental feed. Our research program is guided by the long-term goal to develop a practical way to identify beef cows that excel at converting forage to a healthy weaned calf. Milk is a key factor in cow efficiency because it contributes to both sides of the equation: the output side, in terms of calf growth and immunity; and the input side, in terms of cow cost and fleshing ability. Fleshing ability (or body composition) has long been associated with fertility.

We find tremendous variation in milk yield and milk composition in every group of cows we test for efficiency at Oklahoma State University (OSU). Each cow is milked with a machine about every three weeks. The milk is sampled and tested for fat, protein, lactose and other solids. With the combination of milk yield and milk composition, we can determine the amount of milk energy a cow is producing for her calf each day. The energy is measured and expressed in megacalorie (mcal) units. For perspective, a pound of dry rolled

corn contains about 1 mcals of net energy.

In the current experiment, a group of 4-year-old contemporaries are fed all the unprocessed (long-stem) grass hay they can eat. The hay contains about 14% protein, which is above the protein requirement for a lactating beef cow. Therefore, the cows receive no supplement other than salt and mineral. Daily hay intake is measured in a unique facility designed specifically to measure individual hay intake in beef cows.

Wide variation

In this group of cows, mid-lactation milk yield is averaging 18 pounds, but ranges from 11 pounds to 28 pounds. Milk fat content is averaging 4.5%, with a low of 3.5% and a high of 7.4%. Daily milk energy production is averaging 7 mcals, but ranges from a low of 3.5 to a high of 9.4 mcals. One logical way to look at cow efficiency might be the ratio of hay intake to mcals of milk energy produced. Sort of like a feed to gain ratio for a cow instead of a feedlot steer. One cow in this group is consuming 11.4 pounds of hay to every 1 mcals of milk energy she produces. That's

some expensive milk. At the other end of the spectrum, one cow is consuming only 3.3 pounds of hay for each 1 mcals of milk energy she produces. The surprising thing is the efficient cow only consumes 31 pounds of hay each day, whereas the inefficient cow is averaging 40 pounds of hay consumed each day.

As mentioned previously, body weight change and therefore, body composition change is an important trait in overall cow efficiency. As common sense and reams of research data indicate, there is a negative correlation between milk yield and cow body weight change during lactation. This correlation is around -0.40 in the literature. This is the fundamental concept behind the long-standing caution that genetic potential for milk energy yield can outpace a ranch's forage system in terms of nutrient supply. Where that threshold or sweetspot for milk lies is at least partially dependent on the forage system and the cost of external feed inputs.

Since the correlation between milk yield and cow body weight is not perfect, there are likely some cows that can produce an abundance of milk and maintain their condition better than their herdmates. It also suggests there are likely some cows that lose condition while producing very little milk energy. This speaks to the examples of efficient and inefficient cows cited earlier. Up to now, in this OSU project, the inefficient cow has *lost* 45 pounds, while the efficient cow has *gained* 25 pounds.

To summarize, the inefficient cow is producing very little milk, losing weight and eating a lot of forage. Contrast those characteristics with an efficient cow that is producing a tremendous amount of milk, gaining weight, and consuming an amount of hay that is about average in this contemporary group. We have discovered that this degree of variation in cow efficiency exists in nearly every contemporary group we test.

Likely, everyone has efficient and inefficient cows in their pasture. The problem is that measuring these traits is time consuming, costly and requires intense labor and data management. Our group, along with other scientists, are working towards applying various technologies to rank cows for forage intake and energy (forage) use efficiency. One thing is for sure, we have only scratched the surface of the opportunity available to improve beef production through efficient forage utilization in the cow herd. **BA**

Editor's note: David Lalman is a professor and Harrington Endowed Chair at Oklahoma State University (OSU). Sam Talley is an OSU graduate research assistant studying beef cattle feed efficiency.

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— David Lalman,
Oklahoma State University