

# Feed for optimum calf growth

Is the dairy industry missing an opportunity to enhance calf growth and development? Probably.

By Mike VanAmburgh

**Nutrient intake and immune status** determine calf growth. Conventionally reared calves in the Northeast are fed limited amounts of milk or milk replacer to minimize cost and force calves to consume dry feed and become practicing ruminants.

This approach is adequate if it meets your goals for growth rate, disease resistance and weaning weight. But it can mean you're missing an opportunity to enhance calf growth and development.

Progressive calf management protocols have been written that adopt more aggressive growth and weaning criteria. For Holstein calves, with a 90-pound birthweight, these are:

- Average daily gain: 1.8 to 2.2 pounds per day from birth to weaning at six to eight weeks.
- Weaning weight: 180 to 200 pounds at seven weeks.
- Feed efficiency: 1.5 to 1.7 pounds of feed per pound of gain.
- Height gain: 6 to 8 inches.

New dietary guidelines to achieve these goals are described in Nutrient Requirements for Dairy Cattle, 2001, 7th edition (Dairy NRC). Recent data on the body composition of the growing calf generated at Cornell and the University of Illinois support the predictions of the Dairy NRC calf guidelines.

## Feeding to meet goals

To develop a diet that helps calves reach these goals, the composition of milk replacer and starter grain must be modified to match the calf's requirements.

For example, the calves' energy intake dictates how much energy-allowable bodyweight gain occurs after its maintenance energy requirement is met. The amount of energy-allowable gain then "drives" the protein requirement.

This means there's no specific protein level that is adequate for each rate of gain. As the energy intake increases, the protein required for the energy allowable gain also increases. (Table 1.)

This example illustrates the concept: A 100-pound calf fed 1.25 pounds per day dry

matter of a 20-percent crude protein (CP), 20-percent fat milk replacer has an energy-allowable gain of 0.79 pounds per day and a protein-allowable gain of 0.72 pounds per day.

To achieve the more progressive goals, the calf should receive 2 pounds of the 20:20 milk replacer to meet the energy-allowable gain goal of 1.81 pounds per day.



**Table 1. Effect of rate of bodyweight gain with constant initial bodyweight (100 lb.) on protein requirements of pre-weaned dairy calves (1)**

Rate of gain (lb/d)	ME (Mcal/d)	ADP (g/d)	Required DMI (lb/d)	CP required (% of DM)
0.50	2.30	82	1.11	18.1
1.50	3.80	189	1.83	25.3
2.50	5.53	297	2.67	27.2

1. Amount of milk replacer DM containing 2075 kcal ME/lb DM need to meet ME requirements.

Source: Adapted from Davis and Drackley, 1998. From Drackley, 2000.

However, the protein-allowable gain is only 1.30 pounds per day – a 0.5 pound per day difference, and a significant protein deficiency.

The actual gain would probably fall between the energy- and protein-allowable gains, and the difference would be accumulated fat.

To make the energy- and protein-allowable gains similar, feed a 26- to 28-percent CP milk replacer. Using the Dairy NRC calf model to calculate energy- and protein-allowable gains, the 100-pound calf fed 2 pounds per day of a 28:17 milk replacer would have a 1.81-pound per day energy-allowable gain and a 1.90-pound per day protein-allowable gain. This is a much better balance of energy and protein.

To maintain adequate growth, the starter formulation and milk replacer must have complimentary protein levels and digestible energy. An appropriately matched calf starter would have an as-fed protein level of 21 to 22 percent and readily digestible ingredients. ■

## FYI

■ Mike Van Amburgh is an associate professor in Cornell University's Department of Animal Science.

■ For information on the National Research Council (NRC) Dairy 2001, see this website: <http://www.nap.edu> (search for Nutrient Requirements of Dairy Cattle) or phone order (888) 624-8373. Price is \$59.95 by phone or \$47.96 from the website.

■ Software that can be ordered with a printed copy of the guidelines demonstrates energy-allowable gain and how it drives the protein requirement.