

# CALF COLLEGE™ COURSE NOTES

## — BALANCING WASTE MILK FOR OPTIMAL FEEDING SUCCESS —

### TAKE HOME MESSAGES

- Properly pasteurized waste milk can be a great feed source for preweaned calves, but it can vary considerably in nutritional composition and supply.
- Whole milk does not meet all vitamin and trace mineral levels recommended for preweaned calves.
- Balancer products can adjust solids content and vitamin and mineral levels, for a more ideal ration composition.
- Research shows that calves perform better on waste milk rations that are enhanced with balancers.
- Waste milk supplies can be extended with balancers to provide a consistent liquid nutrition source to young calves every day.
- Using a balancer can allow more milk to be sold from the farm by preventing the need to channel salable whole milk to the calf nutrition program.

Many dairies look to pasteurized waste milk as an efficient and economical source of preweaned calf nutrition. **While properly pasteurized waste milk is a viable option for some herds, there are enhancements that can be made to it, to benefit both the calf performance and the dairy's profitability.**

#### Not quite perfect

Whole milk is an excellent feed source for young calves. But two factors leave some room for improvement: inconsistency and deficiency.

Waste milk on dairies typically is made up of milk from transition cows and milk from treated cows. Because transition milk is higher in fat, protein and total solids than whole milk,<sup>1</sup> total solids will be greater if a batch of milk is generated by a large percentage of fresh cows. Conversely, milk produced by a greater percentage of cows with mastitis or other health conditions could be lower in solids than standard milk.

Handling also is a consistency factor. Waste milk may not be agitated as frequently as salable, bulk-tank milk. Human error also can result in wash water entering the waste milk supply in either the milking system or pasteurization/storage stage.

In addition to the inconsistency in solids, protein and fat, waste milk alone does not provide the vitamins and minerals that calves require. When compared to the National Research Council (NRC 2001) recommendations for dairy calf nutrition (per pound of calf milk replacer solids), **whole milk is deficient in vitamins D3 and E, all seven essential trace minerals, and five of eight essential B vitamins.**<sup>2</sup>

**Because about 50 percent of a dairy cow's frame growth occurs in the first six months of life<sup>3</sup>, delivering required nutrients to developing calves is critical to their long-term viability and performance in the dairy herd.**

1. MidWest Plan Service, Ames, Iowa, 2003. Raising Dairy Replacements.  
2. Wood, D. 2013. Milk-fed Calf Needs Vitamins and Trace Minerals. Animix LLC, Juneau, Wis.  
3. Heinrichs, J and C. Jones 2013. Customized Dairy Heifer Growth Chart, Pennsylvania State University, State College, Pa.

## Seeking ideal balance

Another important consideration when feeding whole milk to calves is the ratio between fat and protein.

On a dry-matter basis, whole milk contains approximately 30 percent fat and 25 percent protein.<sup>4</sup> Research has shown that preweaned dairy calves grow more efficiently when their liquid diet contains a higher percentage of protein than fat.

This is an especially important consideration when delivering a full potential feeding program delivering a higher plane of nutrition. Feeding even more high-fat waste milk will likely result in shorter, fatter heifers. High-fat diets result in poorer feed efficiency, and fat levels above 20 percent of dietary dry matter have been shown to suppress starter-grain intake.

**Raising heifers on exceedingly high-fat diets decreases the probability that they will reach breeding-age growth targets. They also may have difficulty in making the weaning transition.**

Higher-protein diets, on the other hand, have been shown to promote structural growth and lean tissue development in preweaned calves, especially when fed at full potential levels. This developmental advantage has been shown to translate into earlier entry into the milking herd and higher milk production in the first lactation and beyond.<sup>5,6</sup>

To address these shortcomings and provide consistent, optimal nutrition to preweaned calves, pasteurized milk balancer products that enhance whole milk are available.

## Pasteurized milk balancer makes a difference

Balancer products can **correct the variations in solids** content that naturally occur in waste milk, and **adjust the protein:fat ratio** to a more desirable balance. They also can be used to adjust solids levels

to accommodate for environmental challenges during periods of cold and heat stress. Pasteurized milk balancers also **supply vitamins and minerals** to meet requirements for calves. And they can be used to **extend waste milk supplies** when shortfalls occur as well as provide technologies to support gut health.

Recent studies evaluating the performance of calves fed diets of balanced pasteurized waste milk have produced telling results.

- In a trial conducted at a large Arizona calf ranch, **calves fed a milk ration enhanced with pasteurized milk balancer gained 17 percent more from birth to weaning.**<sup>7</sup>
- Researchers at Virginia Tech University **found that calves fed balancer gained 1.32 pounds per day, compared to an average daily gain of 1.14 pounds per day for the calves fed untreated pasteurized waste milk.**<sup>8</sup>
- A study conducted by Land O'Lakes in the southeastern United States showed that weaned calves fed a diet enhanced with pasteurized milk balancer, compared to untreated pasteurized waste milk, showed:

- Additional total weight gain of 2.4 pounds per head (16.1 percent)
- Increased stature growth of 1.3 inches (3.8 percent)
- Additional body length of 2.2 inches (7.3 percent)
- Increased body volume of 33 liters (17.2 percent)
- Lower cost per pound of gain of \$0.25 (17.2 percent)<sup>9</sup>

## Balancer yields best performance

Another recent study by researchers at North Carolina State University concluded that a feeding program incorporating a pasteurized waste milk balancer into a full-potential ration yielded the best performance in preweaned calves.

4. Ferguson, J. 2014. Calves and Heifers VCSN642. Veterinary Medicine, Dairy Nutrition, University of Pennsylvania, Philadelphia, Pa.

5. Soberon F. and M.E. Van Amburgh 2013. The effect of nutrient intake from milk or milk replacer in preweaned dairy calves on lactation milk yield as adults: a meta-analysis of current data. *J. Anim. Sci.* 91:706-712.

6. Van Amburgh M.E. and F. Soberon 2013. Early life nutrition management and the impact of lifetime productivity on calves. *Proc. of 2013 Four State Dairy Management Conference.*

7. Land O'Lakes Animal Milk Products Company field trial 2009. Arizona calf-raising operation. Non-balanced pasteurized milk vs. balanced pasteurized milk.

8. Machado, K.L., R.E. James, M.L. McGilliard and T.J. Earleywine 2011. Effects of hutches and fortified waste milk on growth and health in preweaned Holstein dairy calves. *J. Animal Sci.* Vol. 89(E-Suppl. 1)/*J. Dairy Sci.* Vol. 94(E-Suppl. 1).

9. Land O'Lakes Animal Milk Products Company analysis of on-farm pasteurizers, 2006-2010.

The study evaluated 80 Holstein calves housed in hutches and fed a liquid ration for 56 days. They received one of four feeding treatments:

1. 4 quarts of heat-treated whole milk (total of 1 pound of dry matter) per day
2. 4 quarts of heat-treated whole milk plus pasteurized milk balancer (total of 1.5 pounds of dry matter) per day
3. 4 quarts of heat-treated whole milk (total of 1 pound of dry matter) for the first 14 days of life; 6 quarts of heat-treated whole milk (total of 1.5 pounds dry matter) on days 15-49; and 3 quarts of heat-treated whole milk (total of 0.75 pounds of dry matter) on days 50-56.
4. 4 quarts of heat-treated whole milk plus pasteurized milk balancer (total of 1.5 pounds of dry matter) for the first 14 days of life; 6 quarts of heat-treated whole milk plus pasteurized milk balancer (total of 2.25 pounds of dry matter) on days 15-49; and 3

quarts of heat-treated whole milk plus pasteurized milk balancer (total of 1.13 pound of dry matter) on days 50-56.<sup>10</sup>

All feeding protocols were split between two feedings per day, except for the final week of treatments (3) and (4), which were delivered once a day in the morning.

The researchers found that the calves in group (4) had the greatest bodyweight, average daily gain and feed efficiency. Figure 1 shows the comparison of average bodyweight at weaning for the four treatments.

Of note is the fact that calves fed 4 quarts of milk daily plus balancer [group (2)] had equal or greater weight gain compared to calves in group (3), which received 6 quarts of milk daily without balancer. **While total solids fed were similar between the two programs, calves performed better on the balancer-enhanced diet, and less waste milk was required to achieve a higher rate of gain.**

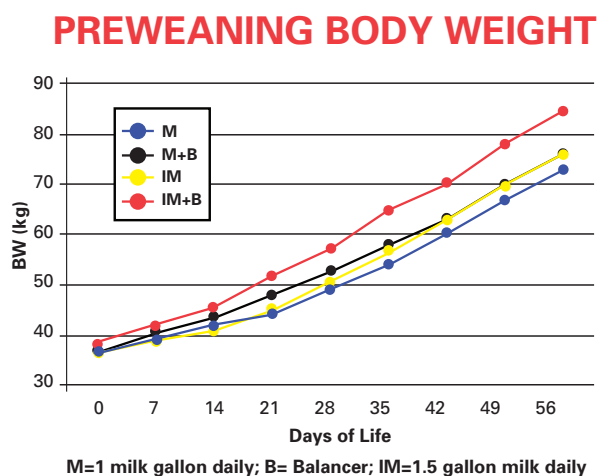
### Supply vs. demand

If health conditions in the milking herd are normal, a dairy usually generates only 30 to 60 percent of the waste milk needed to feed all of its calves. If the dairy is feeding a full potential diet, waste milk would account for only 10 to 20 percent of the liquid diet needed. If a higher percentage of waste milk is available, there may be underlying cow health issues that the herd needs to address.

Waste milk supplies also can fluctuate greatly, depending on the number of fresh and sick cows in the herd. For example, in a recent study of pasteurized waste milk feeding systems in North Carolina dairies, inventory of waste milk on an 1,100 cow dairy varied by as much as 300 pounds per day over a two-week period.<sup>12</sup> On that dairy, younger calves were fed milk replacer to ensure a consistent diet, while pasteurized waste milk was fed to calves four weeks and older.

Utilizing a pasteurized milk balancer and/or full-potential milk replacer can extend the waste milk supply on dairies to ensure a consistent supply of liquid calf feed. That consistency relates to solids content; vitamins and minerals; and supply.

**Figure 1. COMPARISON OF PREWEANED BODY WEIGHT OF CALVES FED BALANCED OR UNBALANCED PASTEURIZED WASTE MILK AT TWO FEEDING LEVELS.<sup>11</sup>**



10, 11, 13: Glosson K. M., B. A. Hopkins, S. P. Washburn, S. Davidson, G. Smith, T. Earleywine and C. Ma 2015. Effect of supplementing pasteurized milk balancer products to heat-treated whole milk on the growth and health of dairy calves. *J. Dairy Science* 98:1127-1135.

12. James, R.E. and M. Scott. 2006. On-farm Pasteurizer Management for Waste Milk Quality Control. *Proceedings 10th Calf and Heifer Conference*, Visalia, Calif. March 21 - 23, 2006.

**If marketable milk is being channeled to calf feed, the dairy could be losing out on potential profits while feeding a less nutritionally consistent and non-fortified product to its calves.**

### **Land O'Lakes pasteurized milk balancers**

Land O'Lakes Animal Milk Products Company offers two lines of Pasteurized Milk Balancer® products:

#### **LAND O LAKES® Pasteurized Milk Balancer®**

**Performance** products are developed for use when waste milk volume is adequate to feed all calves. This line is labeled to be fed at 0.50 pounds per calf per day to boost dry-matter intake and provide fortifying nutrients. It is available in Original and Protein Blend formulas.

#### **LAND O LAKES® Pasteurized Milk Balancer® Full**

**Potential** products are designed for getting calves to achieve their best growth rates and/or extending feed supplies when waste milk volume will not feed all calves. This line is labeled to be fed at 1 pound per calf per day. It is available in Original and Protein Blend formulas.

Both Protein Blend formulas contain a patented blend of primarily milk protein, along with vegetable and functional proteins as well as supplemental amino acids. Data from another recent study at North Carolina

State University shows that protein blend balancer products can achieve equal performance as traditional formula balancers at a lower cost.<sup>13</sup> All LAND O LAKES® Pasteurized Milk Balancer® products contain 25 percent protein and 10 percent fat, to complement and balance the protein and fat levels naturally present in pasteurized waste milk. They also contain supplemental vitamins and minerals to compensate for those deficient in whole milk for optimal calf nutrition, plus Beta glucan. They also can be enhanced with:

- ClariFly® Larvicide (Diflubenzuron) to create improved calf comfort by preventing breeding of house, stable, face and horn flies in the manure of treated calves.
- Bovatec® (Lasalocid) to control coccidiosis and optimize feed efficiency and gain.

By administering these additives via a pasteurized milk balancer, waste milk can deliver the same benefits as commercial milk replacers that often contain the same technologies.

**LAND O LAKES® Pasteurized Milk Balancer® products can help you take pasteurized waste milk feeding to a whole new level of consistency, performance, and profitability.**

Bovatec® is a registered trademark of Alpharma.

ClariFly® is a registered trademark of Wellmark International.

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