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Solutions™ Nouriche Nutrition News

Maximize the Use of Waste Milk for Calves

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Waste Milk.
Hospital Milk.
Pot Milk.
Whole Milk.
Unsaleable Milk.
Bonus Milk.

All are names for the inevitable portion of cow's milk that can't be sold. This protein and energy rich by-product of every dairy includes excess colostrum, transition milk, and milk from mastitic and/or treated cows.

Cow's milk is a very valuable resource, especially when pasteurized to minimize bacterial and viral infection and fortified to meet the calves true requirements.

Why Feed Unsaleable Milk Instead of Milk Replacer?

1) **Simple Economics - save as much as $34.00 per calf.** Excess colostrum, transition milk, and milk from treated cows are not saleable yet are superior to milk replacer for growth and sickness reduction, especially when pasteurized & fortified.

2) **Availability.** It's estimated that between 50 and 135 lb of milk is discarded per cow every year (Blosser, 1979). Why throw money down the drain and buy complete Milk Replacer when you can provide better nutrition at a lower cost? To make your pasteurized fresh milk go farther, simply feed 5-6 pints twice a day and offer starter feed from day 1. Calves should be fed once per day starting on d 29 and weaned by d 35.

3) **Calves gain more weight with lower medication costs** when fed milk because of the higher energy content. **Milk contains 20% more energy than milk replacer.** With equal amounts per day, milk provides 2,970 Kcal of metabolizable energy compared to 2,470 Kcal with milk replacer (Davis and Drackley, 1998).

The Good, The Bad, The Ugly…

Dairymen and calf growers can effectively utilize this natural resource *IF* they follow some simple rules. 1) ***PASTEURIZE*** waste milk before feeding to minimize pathogenic bacteria and viruses; 2) ***FORTIFY*** milk with a quality whole milk fortifier that contains all essential nutrients missing or deficient in milk; 3) ***MAXIMIZE*** use of limited supply of waste milk to provide the greatest advantage for their calves.

Step One: Pasteurize.

Why Pasteurize?

Raw or *non-pasteurized* milk can contain many pathogens such as: *Mycobacterium* avium subsp. *paratuberculosis* (the agent causing Johne's disease), *Salmonella* spp., *Mycoplasma* spp., *Listeria monocytogenes*, *Campylobacter* spp., *Mycobacterium bovis*, and *Escherichia coli*. Raw *un-saleable* milk also contains significantly higher concentrations of pathogens such as *Streptococcus* sp., *Enterobacteriaceae*, and *Staphylococcus* sp. than bulk tank milk or milk replacer. Only through proper pasteurization can calf growers avoid feeding a potentially "toxic soup" to their calves.

What is Pasteurization?

Pasteurization is a process by which milk is heated to a pre-determined temperature for a sufficient amount of time to kill or bring down to a non-harmful level pathogenic microorganisms. Refrigeration, before and after collections and pasteurization, helps minimize bacterial growth. Saleable raw milk is considered to have less than 50,000 Cell Forming Units (CFU)/ml but un-saleable milk kept without refrigeration may reach over 1 billion CFU/ml in summer. To achieve adequate pasteurization efficacy and high quality milk for feeding, it's recommended that levels be less than 1,000,000 CFU/mg (Godden et al., 2005). Many outside laboratories can test un-saleable milk after pasteurization and at feeding to determine microbial load.

Calf Performance with Pasteurized Milk (Godden et al 2005)

1. Pasteurized vs Non-Pasteurized: Gross Margin + $8.41 per calf

In the first study, conducted with 300 calves by the University of California on a commercial dairy, calves fed pasteurized colostrum and milk had fewer sick days, lower mortality rates, lower medication costs, higher weaning weights, and a higher gross margin of **$8.41 per calf** compared to calves fed non-pasteurized milk.

2. Pasteurized vs Milk Replacer: Economic Advantage + $34 per calf

In the second study, conducted over a 10 month period by the University of Minnesota on a commercial calf operation, 438 calves were assigned to either pasteurized non-saleable milk or a control group fed a traditional 20/20 milk replacer. Calves were fed the same amount of liquid each day, but volume was adjusted according to ambient temperature. Calves fed pasteurized non-saleable milk gained more weight and were heavier at weaning compared to calves fed the 20/20 milk replacer. Calves fed pasteurized non-saleable milk had less medication treatments and lower mortality rate overall. The total economic advantage of feeding pasteurized non-saleable milk was estimated at **$34 per calf** compared to feeding milk replacer.

Performance of Calves fed Pasteurized Non-Saleable Milk or 20/20 Milk Replacer (from Godden et al., 2005)

	Pasteurized Non-Saleable Milk	20/20 Milk Replacer
Total Gain, lb	58.9	44.3
Average Daily Gain, lb	1.04	0.77
Weaning Weight, lb	147.2	134.0
Medication Treatment Rate, %	12.1	32.1
Mortality Rate, %	2.3	11.6

Step Two: Fortify.

Nutrient Content	Calf Nutrient Requirements*	Dried Whole Milk**	% of Calf Requirements In Whole Milk
Calcium, %	0.70	1.00	XS[1]
Phosphorus, %	0.60	0.75	XS
Magnesium, %	0.07	0.10	XS
Sodium, %	0.10	0.40	XS
Potassium, %	0.65	1.20	XS
Chloride, %	0.20	0.80	XS
Zinc, ppm	40	26.5	66
Manganese, ppm	40	0.30	< 1
Iron, ppm	100	3	3
Copper, ppm	10	0.6	6
Iodine, ppm	0.25	0.15	60
Selenium, ppm	0.30	0.09	28
Cobalt, ppm	0.10	0.01	6
Vitamin A, IU/kg	3,750	11,500	XS
Vitamin D, IU/kg	595	307	52
Vitamin E, IU/kg	40	8	20
Vitamin K, IU/kg	2.0	0.6	30
Thiamin (B_1), ppm	6.5	3.3	51
Riboflavin (B_2), ppm	6.5	12.2	XS
Niacin (B_3), ppm	2.5	9.5	XS
Pantothenic Acid (B_5), ppm	13.0	25.9	XS
Pyridoxine (B_6), ppm	6.5	4.4	68
Folic Acid (B_{11}), ppm	0.5	0.6	XS
Vitamin B_{12}, ppm	0.07	0.05	71
Biotin (H), ppm	0.1	0.3	XS
Choline, ppm	260	1080	XS
Vitamin C, ppm	100	120	XS

* National Research Council
** Davis and Drackley, 1998
[1]XS=Excess. Milk > Calf requirement

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Whole Milk Is Not Whole!

Growth and health of calves depends on vitamins and trace minerals. Research shows that while milk is a rich source of some nutrients, it is severely deficient in many critical nutrients. Deficiencies include many trace minerals such as zinc, manganese, iron, copper, iodine, selenium and many vitamins such as vitamin D, vitamin E, vitamin K, thiamin, pyridoxine, and vitamin B_{12}. These nutrients are critical for optimum growth, immune system function, DNA synthesis, protein deposition, tissue maintenance, and health.

The table (left) shows the imbalance of nutrients in dried whole milk compared to the calf's nutrient requirements.

Calf growers feeding pasteurized whole milk know that calves look good and perform well - before weaning. But, after weaning, many report that their calves experience a severe post-weaning slump with dull, rough hair coats. Why? Milk is naturally lacking in many nutrients and heat of pasteurization destroys vitamins. Lack of proper fortification results in lower post-weaning performance.

Fortification is the Key:

Help Avoid Post Weaning Slump & To Achieve Better Overall Performance

Solutions® Whole Milk Fortifier for Pasteurized Milk contains ≥100% of the vitamins and trace minerals calves need. *Whole Milk Fortifier* has a soluble base and a super-concentrated 1 ounce per gallon mixing rate. There is no better or more economical way to supplement calves fed pasteurized whole milk!

With proper fortification, calves look great and perform great before AND after weaning. Calves continue to gain and maintain health. The difference you see on the outside is an indication of the true difference on the inside. By fortifying milk, calves receive better nutrition and give you better performance and profits.

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Step Three: Maximize.

Feeding Calves to Perform

Calf growers want to grow better calves, and, they want calves to grow at the most economical rate. Our goals are 1) minimize cost of production; 2) maximize health and performance and; 3) maximize use of available resources when it makes sense.

Minimize Cost of Production

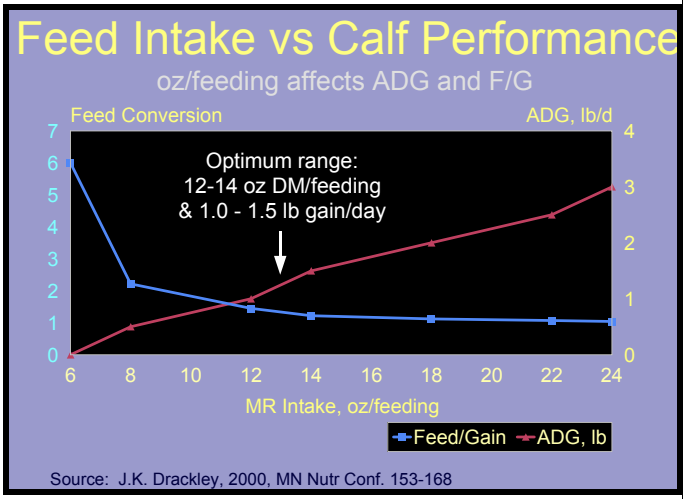
Cow's Milk, whether directly nursed from the cow or pasteurized waste milk tends to produce more profitable calves than milk replacer. In the University of California study cited by Godden et al (2005), calves had considerably better health and faster gain when fed pasteurized non-saleable milk compared to milk replacer. But milk replacer is less expensive than feeding milk that could otherwise be sold.

Comparing calves that suckled vs calves fed milk replacer, Bar-Peled et al. (1997) found that calves that consumed whole milk grew faster for the first 6 weeks, conceived 30 days sooner and produced about 1000 lb more milk in the first lactation than calves fed milk replacer. I'm not suggesting we allow calves to suckle every day, but for dairymen growing replacement heifers, it makes economic sense to feed calves real milk at an optimum rate, to enable them to grow at a faster rate than when fed typical milk replacers. Leading scientists believe that milk contains a number of growth factors not contained in milk replacer and that excellent early calf nutrition, gives the calf metabolic programming, called "imprinting", to grow faster and perform better later in life.

From: Bar-Peled et al, 1997	Suckled	MR	P
Weight, lb Birth	83.3	84.2	NS
6 weeks	**161.8**	**136.5**	**0.01**
12 weeks	**194.7**	**216.5**	**0.05**
At conception	790.6	721.3	NS
Age at conception, days	**394**	**426**	**0.05**
Milk production, lb/300 day	**21,217**	**20,218**	**0.08**
Milk protein, lb/300 day	567	575	NS
Milk fat, lb/300 d	593	603	NS

How Should I Feed My Calves?

To maximize the number of calves raised with limited supply of pasteurized non-saleable milk, feed 5-6 pints of milk per feeding twice per day along with high quality (>18% protein) texturized starter feed and clean, fresh water free choice. Beginning on day 29, calves should be fed milk only once per day and weaned from milk on day 35. Calves should be consuming > 1.5 lb starter per day at weaning. By following this feeding schedule, calves will gain efficiently and economically, and the dairy will maximize the number of calves fed with waste milk available.



Cost of gain is highest for calves that are not gaining weight. We believe the optimum rate of gain is 1.0 - 1.5 lb/day which corresponds to 12-14 oz milk replacer or 5-6 pints of pasteurized non-saleable milk per feeding twice per day. Forty-eight gallons of waste milk will be needed per calf - roughly equal to 60 lb of milk replacer (waste milk generally contains 16-18% solids compared to 12.5% for MR). At this feeding rate, the calf's rate of gain, feed efficiency, and cost per pound of gain is in the optimum range. Calf growers can minimize the cost of production, and maximize the number of calves they can feed on limited supplies of non-saleable milk.