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Calf Note #98 (Updated) – What is the true cost of waste milk?

Introduction

What is the cost of waste milk? For many calf raisers, this is not a question that gets much attention. For some, who get waste milk for free, it's a question they don't want to ask! But, for those producers who raise calves on their home dairy, it's an important one. And, if you're considering using milk replacer, it's a question that should be considered so that a reasonable comparison of the value can be made.

Waste milk – some definitions

Waste milk is the milk produced on the dairy that is not saleable because the cow is too fresh, is abnormal in composition or has been treated with some drug that has a withdrawal time. It is also called "pot milk" and "hospital milk". Of course, the amount of waste milk available will depend on the number of fresh and sick cows that are in the herd at any one time. With any luck, most dairy farmers will have too little waste milk available and the calf enterprise will have to rely on alternative sources of liquid – milk replacer, being the most common. There are some definite downsides to using waste milk. Several of these have been outlined in Calf Notes #08 and #35. Refer to these for more information.

But, what is the value of waste milk? Is it always "free"? Is there (or should there be) a cost associated with waste milk? Although it has no value in the human food chain, it still has value. Waste milk contains nutrients that can be utilized by animals for productive purposes (recognizing all of the risks associated with microbial and antibiotic contamination). So, we should attempt to assess it's value.

Enterprises and costs. To properly calculate the value of waste milk, especially if you're calculating the cost of production, it's important to understand the concept of *enterprises*. I'll explain in the form of an example. Let's say that we have a 1,000 cow dairy that sells all of its calves the day after they are born. Calves are sold to a calf ranch that is located about one hour drive from the dairy. The calf ranch buys the calves at market price for day olds, raises them to just prior to calving and then sells them. If the dairy is in the market for heifers, it might buy back (at springer prices) its own calves, or it might buy calves from other sources.

In this example, the calf raising business and the dairy cow (milking) business are separated, both physically and economically. They are run by separate individuals and have separate profit-loss sheets, net worth statements and cash flows. Decisions are made by separate individuals. Any exchanges between the two farms are based on market rates and there is an exchange of money involved. In this example, we have two separate enterprises from which we can calculate different economic parameters.

Enterprises can be virtual, also. On a dairy, the bookkeeping might be done so that the exchanges between the dairy and the calf enterprises are kept separate. In the case of a dairy, the calf enterprise may charge a daily fee for the cost of raising calves. This charge occurs on paper, but it allows the farm manager to determine how good a job the calf raiser is doing and to decide whether it makes sense to raise calves on the farm or to use a contract calf raiser.

In terms of waste milk, the dairy enterprise should consider selling the waste milk to the calf enterprise. When there are two separate farms, this is quite straightforward, since there is an exchange of money. When there is one farm, this will happen "on the books" and the transfer is in the enterprise budgets only. The question is, how do you value the waste milk?

Ways to calculate value of waste milk

There are several ways that we can estimate the cost of waste milk. They include:

1. the cost of production of fresh milk plus processing
2. value of fresh milk
3. what it costs on the "open" market plus cost of processing
4. assume it's "free"

Cost of production of fresh milk. This may be the most direct method of valuing waste milk, particularly for internal use. Let's say a herd of 1,000 milking cows that produces an average of 27 kg of milk per day (60 lbs/day). On any given day, this herd has 15 cows (1.5%) that produce milk that is classified as waste milk. So, 15 cows × 27 kg = 405 kg or 15 × 60 = 900 lbs of waste milk per day. This would be enough to feed 90 calves if each received 10 lbs of milk per day.

The farmer normally calculates the cost of producing 100 lbs. (or 100 kg) of milk. This cost includes the cost of feed (grown and purchased), labor, utilities, maintenance, veterinary and medications, supplies, breeding, consulting, etc. Let's say that his total costs per hundred lbs. of milk is $10.50/100 lbs. of milk. So, if he can sell his milk for more than $10.50 per 100 lbs., then he can make a profit (ignoring the value of cull cows, sold heifers, etc).

Since this is the cost to produce milk – whether it is saleable or waste – this could be used as an estimate of the value of the milk to the calf enterprise. In this case, the dairy enterprise (which is selling the milk) is breaking even by selling the milk at its cost to the calf enterprise. The calf enterprise is charged what should be a discount compared to buying whole, saleable milk.

Value of fresh milk. In this method, the dairy enterprise assumes no loss to the value of the milk and the transfer of cost to the calf enterprise is at the value of saleable milk.

Value on the "open" market. In some parts of the country, calf raisers can contract with larger dairies to buy their waste milk. The dairy may sell at a significant discount, simply wanting to get rid of what they consider a waste product. The money that the dairy is willing to accept is a good indicator of the value of the waste milk on the open market. It may NOT, however, reflect the inherent nutritional value in the milk. Many dairy producers do not recognize the nutritional value of the product and are simply interested in getting rid of it. These cases are real opportunities for calf raisers.

Assume it's free. Here's a golden opportunity. Free is good (for the calf raiser, anyway). In this case the dairy farmer accepts the entire loss on the milk and the calf raiser gets it free. Clearly, the dairy manager isn't paying attention!

Comparing the cost of waste milk to milk replacer

Let's calculate the value of waste milk on a dry basis so we could compare its value to milk replacer. NOTE: this are only examples for the purposes of these calculations and may not be applicable in your situation. Let's assume that the milk is 12% dry matter, 3.2% protein, 3.5% fat, 4.5% lactose and is valued at $0.105/lb (remember, this is the cost of production on our example farm). On a dry basis, the amount of protein in the milk is 3.2 / 0.12 = 26.7%, the fat is 3.5 / 0.12 = 29.2% and lactose = 37.5%. This equals 26.7 + 29.2 + 37.5 = 93.4% of the total solids in milk. Also, 1 lb of solids costs 0.105 / 0.12 = $0.875.

Next, we have to include cost of processing into the cost of waste milk. This includes the cost of the capital required (pasteurizer) and operation of the pasteurizer. Let's say that a pasteurizer costs $10,000 to buy and $1,000 annual to run and maintain. The depreciation of the pasteurizer over five years is 10,000 / 5 = 2,000. So, our annual cost is $2,000 + 1,000 = 3,000. The producer pasteurizes 900 lbs. of milk per day, so the cost per lb of milk = 3,000 / (900 × 365) = $0.009/lb. On a dry basis, this calculates to 0.009 / 0.12 = $0.08/lb. So, the final cost per of the waste milk is $0.875 + $0.08 = $0.95.

Let's compare the composition and cost of waste milk to a conventional 20% protein and 20% fat milk replacer that costs $40 per 50 lb. bag ($0.80/lb). When we calculate this on a dry basis, this calculates to 21% protein, 21% fat and 47% lactose with a cost of $0.84 per lb. of DM.

So, the milk replacer is a better deal, because it has a lower cost per unit of dry matter, right? Not necessarily! We still have some calculations to do to determine the actual price.

Note that the waste milk is higher in protein and fat than the milk replacer. Let's ignore for the moment the contribution to cost of the various components in milk replacer – vitamins, minerals, lactose and focus on protein and fat. In each lb. of milk replacer, we obtain 0.21 + 0.21 lb. of protein and fat (or 21 units each of protein and fat). If this is worth $0.84, then the value of one unit of protein and fat is worth 0.84 / 42 = $0.020.

Table 1. Composition and cost of waste milk and milk replacer.

Item	Composition	
	As-is basis	**DM basis**
Waste milk		
Solids, %	12.0	100.0
Protein, %	3.2	26.7
Fat, %	3.5	29.2
Lactose, %	4.5	37.5
Cost, $/lb	0.105	0.875
Cost, $/lb pasteurized	0.114	0.955
Cost per unit CP + fat, $/lb.		0.0171
Milk replacer		
Solids, %	95.0	100.0
Protein, %	20.0	21.0
Fat, %	20.0	21.0
Lactose, %	45.0	47.4
Cost, $/lb	0.80	0.84
Cost per unit CP + fat, $/lb.		0.020

For the waste milk, each lb. of dry matter provides 0.267 lbs. of protein and 0.292 lbs of fat or 0.267 + 0.292 = 0.559 lbs. of protein + fat. The cost per unit of fat + nutrients = $0.955 / 55.9 = $0.0171.

So, per unit of fat and protein, the waste milk will be a less expensive option in this simple example. It is possible to calculate values of lactose, vitamins and minerals into the calculation as well, but this would require additional estimates.

Finally, we need to consider the risks involved with feeding waste milk that may be contaminated with pathogens and antibiotics (See Calf Note #35 for more info). Is the level of management on the farm high enough to be sure that the waste milk is not going to cause problems on the farm?

Another important question is the variability in waste milk. Not all waste milk is the same. For example, handling temperatures and time of storage can affect the availability of nutrients and amount of microbial contamination. In our example 90 calves are fed waste milk every day. A failure in the pasteurizer (mechanical or operator error) could potentially infect all 90 calves. This risk associated with waste milk processing and variability must be considered before a decision is made on which feed source to use.

Summary

Waste milk is often considered as a free feed source for the calf enterprise. Too many dairy producers do not recognize the value of the product. A few simple calculations can allow producers to better understand and value the nutrients in waste milk.

Written by Dr. Jim Quigley (01 May 2005)

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