

ECONOMICS OF WINTER MILKING FOR MEDIUM TO LARGE DAIRY SHEEP OPERATIONS

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Words of caution

Although all efforts have been made to be as accurate as possible, numbers given in this article have to be taken with caution. They reflect one type of operation only while there are about as many types of operation as there are producers. Receipts and expenses can vary greatly according to conditions, resources, management skills and philosophy of the operator.

Introduction

As in any enterprise, milking sheep and selling the milk (or processed products) is all about making a profit. Of course, the financial return will be variable according to the producer's reasons for starting a dairy sheep business (practical and/or philosophical), and reasons which are going to influence the type of operation. Nevertheless, no matter the type of operation, it has to be a profitable one while respecting the agro-ecosystem principles of sustainability. There are practically as many types of operation as there are producers, but in North America most sheep dairy enterprises are small-scale family businesses (50-150 ewes) either looking for a supplemental income, or trying to provide a full time occupation to at least one member of the household. These types of operations are generally oriented toward low labor and financial inputs, lambing late in the spring to reduce the needs of buildings and to take advantage of the growth of grass to cover the high nutritional demands of the ewes in full production. With this system, milk is generally produced at a lower cost but the lactation length is shorter because of the declining length of days and because of the high summer temperatures. In larger operations (more than 200 ewes) the initial investment for sheep dairying could be substantial because of the need for better milking equipment, larger freezer, etc. Such operations could look at the feasibility of milking all year around dividing the flock for spring, autumn and winter lambing. However, the system we are mostly interested in this article has older ewes lamb in early winter and young ewes one or two months later. Although demanding more labor and feed inputs, winter lambing and milking offers many advantages.

Implications of winter lambing and milking

Milk production. In this system, the total milk production should be maximized to cover the higher cost of production. Some natural factors such as cold temperatures optimize feed intake, which favors higher milk production. The lengthening of daylight also favors milk production by sustaining lactation for a longer period. Higher milk production can be achieved by removing lambs from their dams soon after birth, raising all lambs on milk replacer and milking the ewes twice per day 3-4 days post parturition. About 30% of the total milk yield is produced during the

first month of lactation. This system is routinely used at the Spooner Research Station. However, ewe lambs (1st lactation ewes) are generally allowed to raise their lambs during the first 30 days, unless the ewe appears to be a heavy milker. The average milk production of all ewes during the 2002 season at the Spooner Research Station is shown in Table 1. It shows an average production of 240 liters (547 pounds) for mature ewes and of 120 liters (274 pounds) for young ewes in 1st lactation). This production is for crossbred East Friesian or crossbred Lacaune ewes. The complete milking (twice a day- no more lambs) or partial milking (once a day but ewes are raising their lambs) during the first month of lactation has to be seriously considered when working with high producing ewes. The amount of milk produced by those ewes during the first 30 days is generally well above the needs of 2 or even 3 lambs. The surplus milk should be collected to avoid high rate of mastitis.

The receipts shown in the example are substantiated by the monthly receipts from milk and animals sold (lambs, ewes, rams) during the year 2002 by the Spooner Research Station (Table 2).

Labor. There is no doubt that winter lambing requires more labor because, with climate such as in Wisconsin, lambing occurs in a shed. Lambs are generally isolated in lambing jugs, stored feed has to be distributed, pens have to be cleaned etc. Moreover, the rearing of lambs on milk replacer will add an extra burden unless the producer is well set up for this endeavor. We consider that 1-1/2 person, beside occasional family help, are needed for the care, lambing, and milking of 300 ewes.

Labor is well utilized at a period when outside work is near impossible. Peaks of lactation for most ewes (therefore longer milking time) occur before field work begins. In spring when outside work becomes possible and necessary, milking is already in a routine phase. When summer comes, milking can be phased down to once a day or better yet to 3 milkings in 48 hours (milking time could be 6 am, 10 pm, 2 pm etc...) leaving more time for family summer activities.

Feed. The highest nutritional needs (end of gestation and early lactation) are met with expensive stored feed. The needs are generally covered with high quality hay and corn. Dairy quality hay can cost as high as \$135 a ton. The use of haylage (\$30 a ton directly from the field) should be strongly considered if it is readily available from a neighbor. During the months of November, December and January ewes are given roughly 1.8 kg (4 pounds) of average quality hay (or 4 kg – 9 lbs haylage) and 2.8 kg (6 pounds) of high quality hay during the first 3 months of lactation (or 5 kg – 11 lbs haylage). A dairy quality grain supplement (16% CP) is provided at a rate of .9 kg/day (2 pounds) during the first 3 months and at a rate of .45 kg (1 pound) for the next 3 months). As soon as the growing season allows, all ewes are grazed on 30 acres of kura clover-orchard grass pastures in a rotational grazing system. The quantity of feed needed for a dairy ewe during the year according to this type of management system is shown in Table 3.

Lambs consume 47 kg (103 pounds) of a 21%CP creep feed between birth and sale at a live weight of 27 kg (60 pounds). Lambs that are fed to slaughter weight consume another 122 kg (268 pounds) of a 12% CP finishing ration. Those lambs are sold at a minimum live weight of 55 kg (120 pounds). Winter lambs are generally sold at the highest price (May-June). Moreover it is sometimes possible to take advantage of the “Greek” lamb market in March or April.

Lambs raised on milk replacer consume an average of 8 kg (18 pounds) of milk powder between birth and weaning at 28 days of age. High quality lamb milk replacer can be purchased for US \$2/kg (92ct/lb) when ordered in large quantity.

Equipment and buildings. The equipment requirement for the milking of 300 ewes is independent of the type of management and season of milking. The system has to be efficient for a rapid milking twice a day, and the freezing capacity (if milk is sold frozen) should be sufficient for the rapid freezing and storage of 350-450 liters (800-1000 pounds) of milk daily during the peak of lactation (see Table 1 in April-May). An additional advantage of winter or early spring milking is that the freezer does not work quite as hard as in June, July or August.

Buildings are necessary for a successful winter lambing especially in cold areas. Their role is to provide protection against the natural elements and therefore do not need to be very sophisticated. They should consist of a main barn where lambing occurs and where ewes spend a minimum amount of time (a few days) and several three-sided shelters with loafing areas where recently freshen ewes and young lambs are transferred to shortly after lambing. "Hoop" or "Green house" type barns with natural ventilation are a good investment for the rearing of lambs on milk replacer. They are quickly set up for a fraction of the cost of a more permanent building. The necessary buildings will significantly increase the fixed cost of the operation. However on well established farms, buildings are generally present and can be used for sheep with little investment cost.

The concentration of sheep in a barn has always been perceived as a leading cause of pneumonia. Therefore barns should be well ventilated. East Friesian lambs or high percentage East Friesian crossbred lambs being very susceptible to pneumonia, their rearing in barns should be of some concerns. However, in our experience we found that pneumonia in lambs is much more prevalent in spring lambing when there is a wide variation of temperature between days and nights.

Bedding. Winter lambing and the use of buildings leads to a high consumption of bedding especially in a dairy sheep operation. The conventional straw bedding is becoming very expensive. In order to keep the 300 ewes of the operation (and their lambs) as clean as possible for milking, a total of 35 tons of straw might be necessary. Good quality straw is difficult to find in the Midwest for less than \$60/ton. Alternatives such as slotted floor could be a solution to reduce the cost of bedding.

Budget analysis

The following budget analysis is for a winter lambing operation with 300 ewes (250 mature ewes and 50 young ewes). The example does not include the incentives provided by the government through the farm bill (ewe lamb payment, feeder or slaughter lamb payment, wool payment). The milk is sold at a fixed price without consideration of its composition (fat and protein). This practice is widely accepted at the present time for lack of a good formula that could adequately estimate cheese yield according to the composition of the milk. It is understood that lower milk production could be compensated by higher fat and protein percentages if a sliding scale payment system was in use. All receipts and all variable expenses of the example are

realistic and directly derived from the Spooner Research Station (Tables 1 and 2). Fixed expenses, however, are more controversial. Thus the example is given with a high and a low debt service.

The Return to Labor and Management (the take home pay of the producer) is as low as \$15,000 with a high debt service and as high as \$33,000 if the farm has a low debt service. High fixed expenses appear to be the leading cause of the high cost of production. Variable expenses can be lowered only as long as it does not affect the well being of the animals **and** of the operator. In our example, the ewe feed cost represents 35% of the variable expenses and it is certainly possible to reduce this amount without affecting the total milk production. Research has shown that high producing ewes, have a better feed efficiency than lower producing ewes. Therefore, with higher producing ewes, the ewe feed cost/receipt from milk ratio would be greatly improved. Also, a less expensive feedstuff than dairy quality alfalfa hay such as haylage should be envisaged.

Total income, also, has a large influence on the Return to Labor and Management, and in the case of a dairy operation, the sale of milk can represent 65% of the total income. Table 4 shows that with the same number of ewes and the same expenses, a flock milk yield of at least 180 liters (high debt) and 120 liters (low debt) is needed to reach the breakeven point. 180 liter/ewe is a respectable average flock yield, which cannot be obtained with poor quality feedstuffs and mismanagement. Moreover, with a lower yield, it would become difficult to sell high price breeding stock. In a winter lambing operation, cost of production can be reduced only by so much before dramatically reducing the total income and thus the Return to Labor and Management. Spring lambing systems, on the other hand, offer more possibilities for the reduction of cost of production and have been shown to allow for a slightly better Return to Labor and Management, at least in a lamb/wool only operation.

The adoption of a lambing system, however, is more often dictated by the conditions, the resources, the availability of goods in or around the farm rather than by real choice. It will be up to the ingenuity, the knowledge, and the skills of the producer to make it work.

RECEIPTS

			Unit price	Total US\$
Feeder lambs	330 lambs	27 kg	1.65	14701
Slaughter lambs	110 lambs	55 kg	1.54	9317
Breeding ewe lambs	40 lambs		200	8000
Breeding ram lambs	5 lambs		500	2500
Sale of older ewes	50 ewes		100	5000
Sale of older rams	2 rams		500	1000
Wool	1200 kg		.44	528
Milk from older ewes	233 ewes	240 l	1.24	69341
Milk from ewe lambs	50 ewes	120 l	1.24	7440
Total receipts				117827

VARIABLE EXPENSES

EWE FEED

Pasture 6 months \$1.50/head/mo	285 ewes		9.00	2565
3 month hay 1.8kg/head/day	300 ewes	162 kg	.10	4860
3 month hay 2.8kg/head/day	285 ewes	252 kg	.15	10773
1 month corn .45 kg/day	300 ewes	13.5 kg	.08	324
3 months dairy ration .90kg/day	285 ewes	81 kg	.15	3463
3 months dairy ration .45kg/day	200 ewes	40.5 kg	.15	1215
Mineral	300 ewes	6 kg	.66	1188

Total ewe feed **24388**

LAMB FEED

Creep feed 21%CP	580 lambs	47 kg	.20	5452
Finish ration 13%CP	115 lambs	122 kg	.14	1964
Hay replacement ewes	60 ewes	150 kg	.15	1350
Corn for replacement ewes	60	100 kg	.08	480
Milk replacer	420 lambs	8 kg	2	6720

Total lamb feed **15966**

LIVESTOCK EXPENSES

Shearing	300 ewes		2	600
Marketing-trucking of lambs				1300
Vet-Med				1000
Supplies – sheep				1500
- milking				2000
Bedding straw	35 tons		60	1750
Utilities - electricity freezer				2500
- other				1000
Machine operation cost				1500
Ram cost				2000
Hired labor	900 hours		9	8100
Maintenance and repairs				1000
Operating loan interest				2000
Pickup truck expenses				1500
Misc.				1000

Total livestock expenses **28750**

Total variable expenses **69104**

<u>FIXED EXPENSES</u>	Investment	Terms (years)	Interest rate	High debt service	Low debt service
Farm payment	150000	30	6%	10800	0
Livestock	20000	20	6%	1720	0
Sheep equipment	15000	15	8%	1716	0
Buildings	30000	15	8%	3432	0
Milking equipment (include freezer)	50000	15	8%	5712	5712
Vehicle	10000	4	5%	2760	2760
Machinery	15000	5	6%	3480	3480
Feed storage	5000	10	8%	732	732
Property taxes				2000	2000
Insurance				1000	1000
Total fixed expenses				33352	15684

RETURNS

Total income				117827	117827
Less variable expenses				-69104	-69104
Return to labor and capital				48723	48723
Less fixed expenses				-33352	-15684
Return to labor and Management				15371	33039
				\$51/ewe	\$110/ewe

Cost of production of milk

Since the cost of production of milk is the difference between the receipt from the sale of milk and the expenses solely occurred for the production of this milk, it should roughly be similar in many types of operations. Expenses imputable to milk production are found in all expense categories.

Ewe feed. Not all ewe feed is imputable to milk production. If ewes were not milked, they would still need to be fed accordingly for the production of lambs, unless lambs become a secondary product (most lambs sold at one day of age, for example) in which case all feed (and expenses) would be attributed to milk production. Feed cost at the end of gestation and early lactation are basically the same between a meat only operation and a dairy operation. The difference comes in a longer period of high quality feedstuff, mostly in terms of concentrates. In a meat only operation ewes would be fed corn for 45 days post parturition instead of a higher priced dairy ration for 6 months. Therefore, in the example the extra ewe feed cost imputable to dairying amounts to US\$ 4030.

Lamb feed. In a dairy operation lambs are weaned at 30 days or earlier which translates into a higher consumption of expensive creep feed (+ 20 kg/lamb between day 30 and 60) and of finish ration (+32kg/lamb) for a total of US\$ 2835. Lambs weaned at an early age need to receive a high protein ration and cannot be put on forage. The extra cost cannot easily be decreased.

Supplies. Supplies for milking such as detergent, acid, brushes, liners, milk tubes, milk filters etc... and lab cost for milk analysis is estimated at US\$ 2,000.

Utilities. The single most expensive item is the operating cost of the commercial freezer estimated at US\$ 2,500 for the milking season.

Labor. With an efficient system, the milking of 280 ewes should not last more than 4-5 hours a day as an average over the all season of 180 days. Considering that the producer's salary should be at least \$13/hour, the cost of labor for milking is US\$ 11,700. Moreover, about 3/4 of the hired labor cost is imputable to the dairy operation or US\$ 6,075. The total labor cost for the milking and extra care of 270 ewes is therefore US\$ 17,775.

Milking system. The cost of amortization of the milking system is imputable to milking, that is, US\$ 5712.

The total cost of production of the 61,920 liters (220 liter flock average) of milk in the system described above is US\$34,852 or **.56/liter**. The difference between the cost of production and the sale price of milk represents the deficit or the profit of the dairy operation in the overall sheep enterprise. The cost of production varies greatly according to the average milk yield of the flock as shown in Table 5.

Table 1. Number of ewes, average milk production, % fat, % protein at each testing day (every 28 days) during the 2002 season at the Spooner Ag. Research Station (all breeds or genotypes confounded). Production given in liters. 1 liter = 1036 g = 2.28 pounds

Test Date	2, 3, 4 year old ewes				1st lactation, 1 year old ewes			
	# of ewes	Milk (liters)	% fat ¹	% prot ¹	# of ewes	Milk (liters)	% fat ¹	% prot ¹
2/5/02	30	2.77	6.75	5.87				
3/5/02	153	1.81	7.19	5.58				
4/2/02	185	1.78	6.40	5.00	33	1.66	6.80	5.30
4/30/02	181	1.41	5.80	5.06	78	1.51	5.80	4.74
5/28/02	176	1.46	5.29	4.90	134	1.56	5.29	4.60
6/25/02	172	.95	5.97	4.70	148	1.00	5.58	4.40
7/23/02	159	.80	6.54	5.00	143	.80	6.17	4.80
8/20/02	138	.60	7.72	5.90	128	.60	7.45	5.70
9/18/02	138	.50	7.50 ²	5.73 ²	128	.50	7.50 ²	5.73 ²
# of ewes at breeding		200				170 ³		
# of ewes put at milking(%)		185 (93%)				148 (87%)		
Average milk production		240 liters ⁴				120 liters ⁴		

¹ Average of individual samples

² Bulk tank composition

³ The Spooner Research Station retains many more ewe lambs than necessary because of its genetic research program.

⁴ Include all ewes having entered the milking parlor for at least 4 days

Table 2. Amount of milk and number of animals sold per month, and monthly receipts (milk and animals) during 2002 at the Spooner Research Station (UW-Madison).

Months	Milk (liters)	Animals (#)	Receipts milk US\$	Receipts animals US\$	Total Receipts US\$
January	492	0	611	0	611
February	3704	0	4602	0	4602
March	9518	0	11827	0	11827
April	9640	195	11979	9417	21396
May	11820	136	14687	7185	21872
June	11355	0	14109	0	14109
July	8411	15	10451	951	11402
August	5113	25	6353	2406	8759
September	2394	95	2974	9081	12055
October	0	105	0	12950	12950
November	0	0	0	0	0
December	0	0	0	0	0
Total	62447	571	77593	41990	119583

Table 3. Quantity of feed needed by a dairy ewe during the year.

	Complete confinement all year around	Semi confinement winter lambing	Semi confinement spring lambing
Average quality hay	486 kg	162 kg	324
Good quality hay	252 kg	252 kg	0
Corn (kg)	148	120	80
Soybean meal (kg)	20	18	12
Pasture	-	4 month high quality 2 months low quality	6 month high quality

Table 4. Expected returns to labor and management according to the price of milk and milk yield considering all other receipts and expenses similar to the example with a high debt service (**bold**) and low debt service (*Italic*).

Price of milk in US\$/liter	Average milk yield of the flock in liters					
	140	160	180	200	220	240
1.14	(-16243)	(-9791)	(-3338)	3114	9566	16019
	<i>1425</i>	<i>7877</i>	<i>14330</i>	<i>20783</i>	<i>27236</i>	<i>33689</i>
1.24	(-12281)	(-5263)	1756	8774	15792	22810
	<i>5387</i>	<i>12405</i>	<i>19423</i>	<i>26441</i>	<i>33459</i>	<i>40477</i>
1.37	(-4755)	624	8378	16132	23886	31640
	<i>10537</i>	<i>18292</i>	<i>26028</i>	<i>33783</i>	<i>41738</i>	<i>49293</i>

Table 5. Cost of production of a liter of milk in a winter lambing operation according to the average milk yield of the flock.

Average milk yield of the flock in liters						
100	120	140	160	180	200	220
\$1.23/l	\$1.03/l	\$0.88/l	\$0.77/l	\$0.68/l	\$0.62/l	\$0.56/l

