

Projected economics for a range-based commercial sheep operation in North Dakota

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The objective was to determine expected sources of revenues, production costs, and net return to management and overhead for a representative 250-ewe commercial range-based sheep operation common to North Dakota. The results suggest that for the 2025/2026 production year, producers can expect to earn a net return to management and overhead of \$31.28/ewe (\$7,824/operation).

Summary

The objective was to determine expected sources of revenues, production costs, and net return to management and overhead for a representative 250-ewe commercial range-based sheep operation common to North Dakota. Enterprise budgeting techniques were used to calculate projections for revenues, production costs, and net returns to management and overhead. Data for projected prices and quantities used in the analysis were obtained from local markets, supply dealers, industry and academic reports and publications, and academic experts and experienced sheep producers. Results suggest that producers can expect to earn a net return of \$31.28/ewe (\$7,824/operation) over the 2025/2026 production year, and this is net of the cost of land and owner's labor. The individual breakeven prices of feeder lambs, pasture rent,

hay and grain-based feed are \$2.66/lb, \$45/acre, \$140/t and \$274/t, respectively.

Introduction

Sheep production is an important economic activity in North Dakota. According to the Census of Agriculture, in 2022, there were 62,000 sheep on North Dakota farms across 482 operations that generated a combined total gross income of \$7.46 million (USDA-NASS, 2026). A significant portion of sheep in North Dakota is produced on range-based forages located west of the Missouri River. Current, reliable estimates of revenue sources and individual production costs for commercial range-based sheep operations in North Dakota are not currently available to help sheep producers base upcoming production and marketing decisions for their operations. The specific objectives were to determine projections of revenue sources, individual production costs, and net return to management and farm overhead for a representative 250-ewe range-based sheep operation for the 2025/2026 production year, as well as to

determine breakeven prices for feeder lambs, pasture rent, hay and grain-based feed.

Materials and Methods

Enterprise budgeting techniques were used to calculate sources of revenue, individual production costs, and net returns to management and overhead for the representative North Dakota sheep operation (AAEA, 2000). Data on prices and quantities used in the analysis were obtained from local markets, supply dealers, industry and academic reports and publications, and industry and academic experts and experienced sheep producers. Essential projections for price and quantity parameters are reported in Table 1. Assumptions used in our calculations for revenues and individual production costs are reported in the following paragraphs.

We assumed that sheep operators will produce feeder lambs with an average weight of 75 pounds with a lambing rate equal to 1.25 lambs/ewe, with culling rates of 10% for ewes and 15% for rams. NDSU projections for feeder lamb prices for October 2026 were assumed to be in the neighborhood of \$3.00/lb. We used a mature ewe death loss rate of 6.5% of the flock, a coverage rate of 31 ewes per ram (8 rams/flock) and a 4% transportation shrink in the revenue calculations. Although the current price of wool is \$0.90/lb, the cost to transport wool to the closest buyer in Belle Fourche, South Dakota, is expected to be much greater than the value of the wool, so we assumed

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Table 1. NDSU projections for essential price and quantity parameters

Price/assumptions	\$/unit
Feeder lambs (\$/lb)	3.00
Wool, market (\$/lb)	0.00
Pasture rental rate (\$/acre)	30.00
Price of hay (\$/ton)	80.00
Price of grain-based feed (\$/ton)	150.00
Distance to market (miles)	50
Price for shearing (\$/ewe)	8
Price for shearing (\$/ram)	12
Round-trip distance to shear site (miles)	300
Wage rate for hired labor (\$/hour)	25.00
Wage rate for owners/family labor (\$/hour)	25.00
Interest rate for operating capital (% APR)	6.50%

the price of wool is equal \$0.0/lb. However, loan deficiency payments for unshorn pelts (\$2.59/lamb) and ungraded wool (\$0.38/lb) for lambs, ewes and rams were included as sources of revenue.

To calculate the costs for pasture and feed, we assumed that it would require two acres of pasture at a rate of \$30/acre to support one ewe, and pasture would be grazed for 180 days per year, implying that ewes and rams would be provided feed in a drylot for 185 days during the winter months. We assumed that sheep would require a daily ration of hay at a quantity equal to 3% of their body weight at a price of \$80/t, and require a daily ration of grain-based feed equal to 1.5% of their body weight at a price of \$150/t. We also included the cost of feed for guard dogs.

NDSU Extension's recommended vaccination and healthcare regimens for lambs, ewes, rams and guard dogs were budgeted using current market prices obtained from local farm supply retailers. The annual cost of breeding rams was amortized over five years, assuming a purchase price of \$500/ram, a life expectancy of five years and an interest rate for investment capital of 7.5%. In addition, a breeding soundness exam was included at a cost of \$75/ram.

We calculated marketing costs using average market rates for auction/commission fees (\$2.25/lamb), inspection (\$0.15/lamb), yardage (\$0.35/lamb), feed (\$0.25/lamb) and mandatory checkoff costs for live sheep (\$0.007/lb), feeder lambs (\$0.53/lamb), cull ewes (\$0.05/ewe) and cull rams (\$1.58/ram).

The costs for shearing included the 2026 federal mileage rate of \$0.72/mile for a round-trip distance of 300 miles, plus shearing rates of \$8/ewe and \$12/ram, and lunch and beverages for breaks for the shearer (and helper) at a cost of \$60.

Feeder lambs, cull ewes and rams were assumed to be transported using a commercial truck and a 48-by-53-foot livestock trailer with an animal capacity of 1,284 square feet. Required spacing for lambs, ewes and rams was assumed to be 2.75, 4.50 and 5.50 square feet, respectively. A 50-mile distance-to-market and round-trip price of \$6.5/mile was assumed for transportation cost calculations.

Costs for hired and family labor were included in the budget, assuming 1.5 hours of labor per day per flock on pasture and three hours per day per flock in drylot during the winter. It was assumed that the share of hired labor was 10% of total labor

hours needed during the production year; that is, the family provides 90% of all labor. A wage rate of \$25/hour was used to calculate the cost of hired labor and family labor.

In addition to having dogs for herding and protecting sheep on pasture, costs for nonlethal predator control were included at \$750/year. We assumed that producers would take advantage of the \$150 federal cost share for nonlethal options for predator control products, so the total cost was \$600/year. The type of nonlethal control was not assumed, but examples of devices qualifying for cost share include fencing and barriers, light and sound devices, and sheep bells.

Annual fixed costs (\$/ewe) were calculated for alternative pieces of machinery and equipment deemed necessary for a commercial range-based sheep operation in North Dakota. They include the use of a 90-horsepower 4x4 tractor (\$60,000), an all-terrain vehicle (\$15,000), a half-ton work truck (\$50,000), eight six-panel hay ring feeders (\$300/feeder) and three feeders for feeding grain rations (\$1000/feeder). We assume all machinery and equipment are purchased new with a seven-year life expectancy and a 30% salvage value for the tractor, truck and ATV. It was also assumed that only 25% of the tractor, truck and ATV would be used for the sheep enterprise. All other buildings, equipment and machinery used for sheep production are considered part of farm overhead.

Variable costs for fuel, lubrication and repairs were calculated as 7% of each piece of machinery's initial purchase price, multiplied by the 25% rate that machinery was assumed to be used for the sheep operation. In addition, utilities were assumed to be \$150/month, taxes were assumed to be 1% of the assessed value of the land on a dollar-per-ewe basis, and farm liability insurance was assumed to be \$1,000/year, or \$4/ewe.

Results and Discussion

Results suggest that producers can expect to earn a net return of \$31.28/ewe (\$7,824/operation) over the 2025/2026 production year (Table 2). Total gross revenue was projected to be \$295/ewe, with 92% expected to come from the sale of feeder lambs. Total cost (variable and fixed) is projected to be \$264/ewe, with variable costs accounting for 89.4% of the total. Costs associated with pasture (rent), hay and feed combined account for 56% of total costs. Fuel, lube, repairs and utilities are expected to be roughly 6% of total costs, and labor (family and hired labor combined) accounts for about 10%. Fixed costs account for 10.57% of total costs, with annual fixed costs for machinery and equipment accounting for about 80% of total fixed costs. When multiplied over the 250-ewe operation, the net return of \$264/ewe translates into a total projected profit of \$7,824 for the 2026 production year.

The projected net return is most sensitive to feeder lamb prices, pasture rent rates, and hay and feed prices; breakeven prices for those variables are reported in Table 3. The breakeven price for feeder lambs is \$2.66/lb (i.e., the price where net return = \$0.00/ewe), which is only 11% less than the projected 2026 price of \$3.00/lb. Holding all other prices constant, the most a producer can afford to pay to rent pasture is \$45/acre, which is 50% more than the assumed rate in the model. The projected net return is also sensitive to the prices of hay and feed but to a lesser degree than feeder lamb prices. Holding all other prices constant, the most a producer can afford to pay for hay is \$140/ton, 78% more than the assumed price, and the breakeven price of grain-based feed is \$274/ton, which is 83% more than the assumed price. It is important to note that the projected net return of \$31.28/ewe is net of the cost of pastureland and labor (hired and family). Excluding

Table 2. Projected sources of revenue, production costs and net return for a representative 250-head range-based sheep operation in North Dakota

Gross revenues:	\$/ewe	\$/flock	%/revenue
Lambs	270.00	67,500	91.56%
Cull ewes	13.87	3,468	4.70%
Cull rams	0.88	220	0.30%
Wool, including loan deficiency payments	10.14	2,536	3.44%
Total gross revenue	294.90	73,724	100.00%
Variable costs:	\$/ewe	\$/flock	%/total cost
Pasture	60.00	15,000	22.76%
Hay	39.34	9,835	14.92%
PRF rainfall insurance	5.50	1,375	2.09%
Feed grain	36.88	9,220	13.99%
Salt and mineral	6.03	1,507	2.29%
Veterinarian and health	4.60	1,150	1.75%
Breeding (ram cost per ewe)	6.35	1,589	2.41%
Marketing and hauling	5.13	1,283	1.95%
Fuel, lube, repairs and utilities	16.58	4,144	6.29%
Shearing ewes	9.36	2,340	3.55%
Predator control (nonlethal)	2.40	600	0.91%
Dog food for three sheep dogs	7.88	1,971	2.99%
ALB checkoff	0.75	189	0.29%
Operator/family labor	24.30	6,075	9.22%
Hired labor	2.70	675	1.02%
Interest on operating capital	7.95	1,986	3.02%
Total variable costs	235.76	58,937	89.43%
Fixed costs:	\$/ewe	\$/flock	%/total cost
Machinery, equipment and vehicles	21.88	5,470	8.30%
Interest on retained livestock	0.47	118	0.18%
Taxes and insurance	5.50	1,375	2.09%
Total fixed costs	27.85	6,963	10.57%
Total costs	263.61	65,900	100.00%
Net return to management and overhead	31.28	7,824	-

pasture rent and owner's labor cost, the net return would be \$112/ewe.

Conclusions

The net return of \$31.28/ewe for a representative 250-ewe operation is expected to be quite a bit higher than previous years, reflecting a significant increase in feeder lamb prices driven by strong consumer demand for lamb, as well as relatively steady feed and hay prices. Note that this projection is based solely on NDSU projections for prices for the

Table 3. Breakeven prices of feeder lambs, pasture rent, hay and grain-based feed.

Price variable	Breakeven price (\$/unit)
Feeder lamb price (\$/lb)	2.66
Pasture rental rate (\$/acre)	45
Hay price (\$/ton)	140
Feed price (\$/ton)	274

2025/2026 production year. However, because every range-based sheep operation differs in size and scope, we extended our effort with this project to develop an Excel-based decision support tool that allows producers to enter their own operation-specific projections for price and quantity parameters, allowing them the option to make a direct comparison between the economics of their own individualized economic projections and NDSU projections. The interactive decision tool can be found at <https://www.ndsu.edu/agriculture/ag-hub/ag-topics/livestock/tools>.

Literature Cited

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