
2020 Cost of Production Silage



Guidelines For Estimating Silage Production Costs - 2020

Date: January, 2020

****revised 02/24 with 2020 MASC data****

This guide is designed to provide planning information and a format for calculating the costs of producing barley, corn and alfalfa grass silage for the purpose of feeding livestock in Manitoba. General Manitoba Agriculture recommendations are assumed in using fertilizers and chemical inputs. These figures provide an economic evaluation of the crops and estimated yields required to cover all costs. Costs include labour, investment and depreciation, but do not include management costs, nor do they necessarily represent the average cost of production in Manitoba.

The assumptions on which the costs were calculated are clearly defined in the supporting pages. They were developed using a combination of recommended practices and methods followed by many producers. The major advantage of silage is that the crop can be harvested when it is ready in almost all weather conditions. Since there are fewer harvesting losses, more nutrients are harvested per acre compared with most other systems. Ensiling permits the use of a wider range of crops including grasses, legumes, grains, corn and miscellaneous salvage crops that have suffered weather damage or weed infestation. The major disadvantages of silage compared with hay is that it requires more capital investment and labour. Also, silage has limited market potential, because trucking costs limit distance to market, it must be produced near the location where it will be fed.

These budgets may be adjusted by putting in your own figures. As a producer, you are encouraged to calculate your own costs of production for your silage crops. On each farm, costs and yields differ due to soil type, climate and agronomic practices.

This tool is available as an Excel worksheet at: www.manitoba.ca/agriculture
or at your local [Manitoba Agriculture Office](#).
[The Farm Machinery Custom and Rental Rate Guide](#) is also available to help determine machinery costs.

Note: This budget is only a guide and is not intended as an in depth study of the cost of production of this industry. Interpretation and use of this information is the responsibility of the user. If you need help with a budget, contact your local Manitoba Agriculture office.

Silage Production Cost Summary - 2020											
	Barley Silage			Corn Silage			Alfalfa-Grass Silage				Your Farm
	Annual			Annual			Year 1 Forage	Annual (Years 2 to 8)			
	Production Costs			Production Costs			Establishment ¹	Production Costs			
	(as fed)	(Dry Matter-DM)		(as fed)	(DM)		(as fed)	(DM)			
	\$/acre	\$/ton	\$/ton	\$/acre	\$/ton	\$/ton	\$/acre	\$/acre	\$/ton	\$/ton	
A. Operating Costs											
Seed & Treatment	\$16.88			\$92.80			\$36.00	-			
Nurse Crop Seed	-			-			\$9.06	-			
Establishment (amortized)	-			-			-	\$4.67			
Fertilizer	\$52.41			\$98.41			\$62.65	\$41.50			
Herbicide/Insecticide	\$12.00			\$12.00			\$25.00	\$0.00			
Field Fuel Costs	\$14.50			\$14.74			\$19.44	\$10.57			
Moving Fuel Costs	\$2.43			\$4.53			\$1.32	\$2.04			
Packing Fuel Costs	\$2.38			\$4.43			\$1.29	\$2.00			
Machinery Operating	\$15.00			\$15.00			\$15.00	\$15.00			
Machinery Lease	\$4.80			\$4.80			\$4.80	\$4.80			
Crop Insurance	\$10.94			\$13.62			\$5.00	\$9.91			
Miscellaneous	\$7.50			\$8.50			\$2.00	\$4.50			
Land Taxes	\$10.00			\$10.00			\$10.00	\$10.00			
Rental & Custom Costs	\$0.00			\$0.00			\$0.00	\$0.00			
Interest on Operating	\$4.09			\$7.67			\$5.27	\$2.89			
Total Operating	\$152.92			\$286.51			\$196.83	\$107.88			
B. Fixed Costs											
Depreciation											
Machinery Depreciation	\$37.50			\$37.50			\$37.50	\$37.50			
Bunker Storage	\$3.33			\$5.00			\$3.33	\$3.33			
Investment											
Land Investment Costs	\$51.98			\$51.98			\$51.98	\$51.98			
Machinery Investment	\$10.31			\$10.31			\$10.31	\$10.31			
Bunker Storage	\$0.46			\$0.69			\$0.46	\$0.46			
Total Fixed	\$103.58			\$105.48			\$103.58	\$103.58			
Total Operating & Fixed	\$256.50			\$391.99			\$300.42	\$211.46			
C. Labour											
	\$36.77			\$54.98			\$36.77	\$21.77			
Total Costs	\$293.27	\$39.10	\$106.26	\$446.97	\$31.93	\$110.86	\$337.18	\$233.23	\$36.96	\$85.56	
Total Costs (\$/lb.)		0.0196	0.0531		0.0160	0.0554			0.0185	0.0428	
Profitability & Breakeven Analysis											
Estimated Farmgate	As Fed	DM		As Fed	DM		As Fed	DM			
Price \$ per ton	\$49.80	\$135.33		\$42.75	\$148.44		\$74.64	\$74.64	\$172.77		
Yield per acre (ton)	7.50	2.76		14.00	4.03		4.08	6.31	2.73		
Gross Revenue	\$373.50			\$598.50			\$304.52	\$470.95			
Marginal Returns	(as fed)	(DM)		(as fed)	(DM)		(as fed)	(DM)			
	\$/acre	\$/ton	\$/ton	\$/acre	\$/ton	\$/ton	\$/acre	\$/acre	\$/ton	\$/ton	
Over Operating Costs	\$220.58	\$29.41	\$79.92	\$311.99	\$22.28	\$77.38	\$107.69	\$363.07	\$57.54	\$133.19	
Over Total Costs (Net Profit)	\$80.23	\$10.70	\$29.07	\$151.53	\$10.82	\$37.58	(\$32.66)	\$237.72	\$37.67	\$87.21	
Operating Expense Ratio	40.9%			47.9%			64.6%	22.9%			
Breakeven Price Per Ton											
Operating Costs	\$20.39	\$55.41		\$20.47	\$71.06		\$17.10	\$39.57			
Total Costs	\$39.10	\$106.26		\$31.93	\$110.86		\$36.96	\$5.86			
Breakeven Yield (tons per acre)											
Operating Costs		3.1			6.7			1.4			
Total Costs		5.9			10.5			3.1			
Cost of Standing Silage (\$/lb.)		\$0.012 ²			\$0.011 ²			\$0.010 ³			
TDN & Crude Protein Cost Analysis											
	Barley Silage			Corn Silage			Alfalfa-Grass Silage				
	Nutrient Cost (\$/pound DM)			Nutrient Cost (\$/pound DM)			Nutrient Cost (\$/pound DM)				
	TDN	Crude Protein		TDN	Crude Protein		TDN	Crude Protein			
	(62.8%)	(11.1%)		(64.6%)	(8.7%)		(60.4%)	(14.6%)			
Without Storage Loss	\$0.0846	\$0.4786		\$0.0858	\$0.6371		\$0.0708	\$0.2930			
With 5% Storage Loss (as fed)	\$0.0891	\$0.5038		\$0.0903	\$0.6706		\$0.0746	\$0.3084			

1. Alfalfa-grass establishment (with oat silage nurse crop) net cost of \$32.66 (total cost minus estimated gross revenue) were amortized over 7 silage production years.
 2. Cost of barley and corn standing silage (includes: seed; fertilizer; pesticide; land taxes; crop insurance; 40% of fuel; 20% of labour, machinery lease, and machinery operating; 50% of other costs, and 2.75% land investment costs.)
 3. Cost of alfalfa and alfalfa-grass standing silage (includes: establishment, fertilizer, pesticide, land taxes, crop insurance, 5% of fuel and labour, 50% of other costs, and 2.75% land investment costs.)

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Risk & Sensitivity Analysis (Stress Test)

Percent Market Price Change	0.0%
Percent Crop Yield Change	-10%

	Barley Silage	Corn Silage	Alfalfa-Grass Silage	Your Farm
Market Price (\$ per unit)	\$49.80	\$42.75	\$74.64	_____
Yield (per acre)	6.75	12.60	5.68	_____
Stress Test Scenario = Market Price Up 0%, and Crop Yield Down 10%				
Net Profit (Loss)	\$42.88	\$91.68	\$190.70	_____
Operating Expense Ratio	45.5%	53.2%	25.4%	_____
Cost per ton	\$43.45	\$35.47	\$41.06	_____
Cost of TDN (\$ per pound)	\$0.094	\$0.095	\$0.079	_____
Cost of Crude Protein (\$ per pound)	\$0.532	\$0.708	\$0.326	_____

Agrilinsurance Analysis

Forage Region 6
Risk Area 14

Barley Silage
80% Coverage

Corn Silage	Alfalfa Grass	
	>4 years	
80% Coverage	Select Hay	Basic Hay
		High - \$84/tonne

Your Farm _____

Agrilinsurance

Probable Yield - IC (tons/acre)	4.838	13.323	3.198	3.198	_____
Coverage per acre (tons)	3.870	10.658	2.558	2.558	\$3.00 _____
Dollar Coverage per acre	\$146.11	\$483.55	\$158.34	\$96.40	\$4.00 _____
Premium (\$/Acre)	\$10.42	\$13.10	\$9.91	\$4.83	\$5.00 _____
Premium Cost (% of Insured)	7.1%	2.7%	6.3%	5.0%	_____

Costs Not Covered By Agrilinsurance

Operating Costs	\$6.81	\$0.00	\$0.00	\$11.48	\$8.00 _____
Operating & Fixed Costs	\$110.39	\$0.00	\$53.12	\$115.06	\$9.00 _____
Total Costs	\$147.16	\$0.00	\$74.89	\$136.83	\$10.00 _____

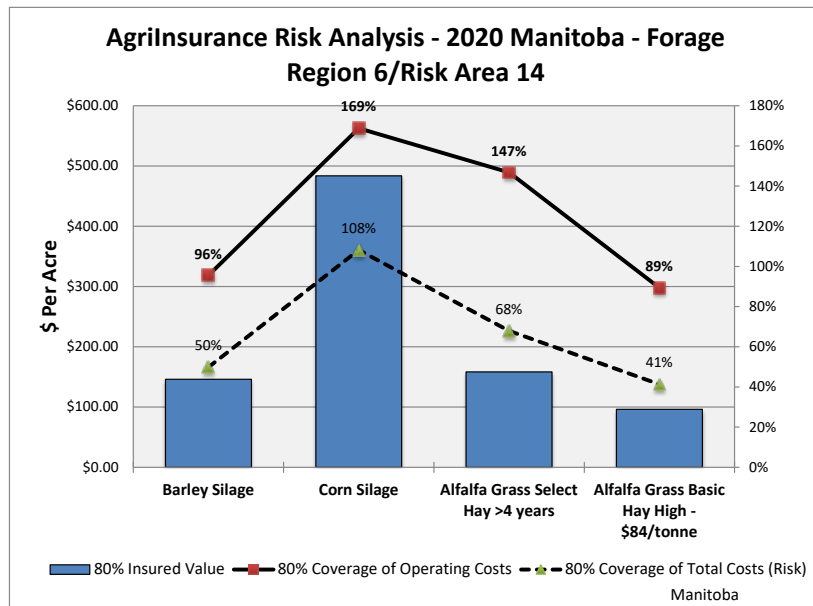
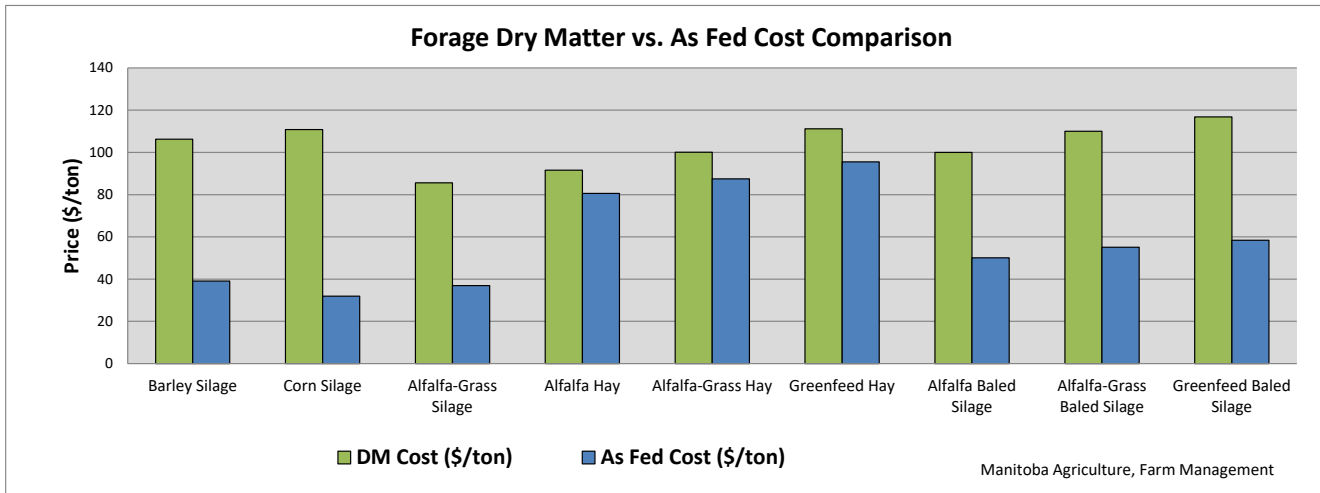
Agrilinsurance Risk Ratio (Agrilinsurance Coverage / Cost)

Operating Costs	96%	169%	147%	89%	12% _____
Total Costs	50%	108%	68%	41%	13% _____

Forage Cost Comparison Analysis

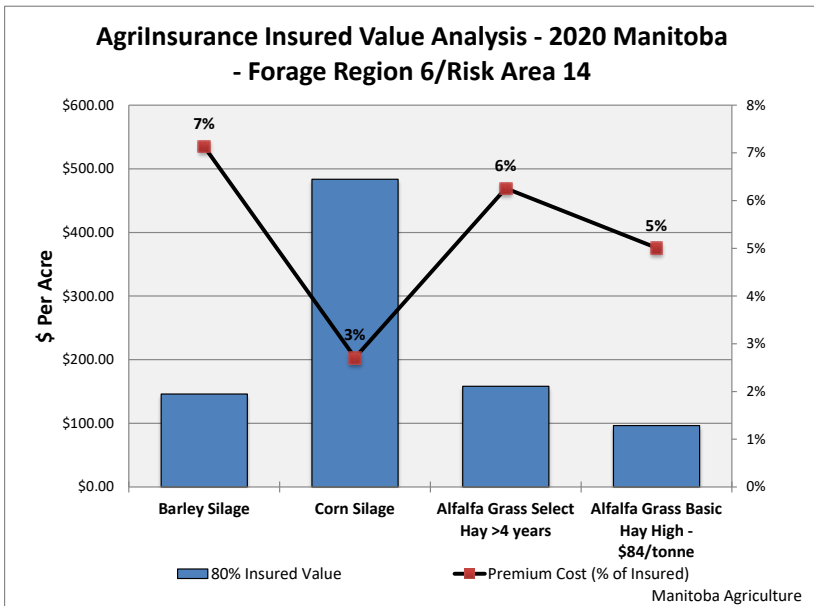
	Barley Silage	Corn Silage	Alfalfa Grass Silage
Cost of Silage (\$/wet ton)	\$39.10	\$31.93	\$36.96
Equivalent Dry Hay Value (TDN Basis) for Breakeven Purchase Decision:			
Alfalfa/Grass - 12.6% H2O, 60% TDN	(\$/ton) \$88.73	\$89.99	\$74.28
	(\$/lb.) \$0.044	\$0.045	\$0.037
Alfalfa - 12.1% H2O, 61.5%TDN	(\$/ton) \$91.47	\$92.77	\$76.58
	(\$/lb.) \$0.046	\$0.046	\$0.038
Equivalent Dry Hay Value (CP Basis) for Breakeven Purchase Decision:			
Alfalfa/Grass - 12.6% H2O, 14% CP	(\$/ton) \$117.13	\$155.91	\$71.71
	(\$/lb.) \$0.059	\$0.078	\$0.036
Alfalfa - 12.1% H2O, 18.2% CP	(\$/ton) \$153.14	\$203.85	\$93.75
	(\$/lb.) \$0.077	\$0.102	\$0.047

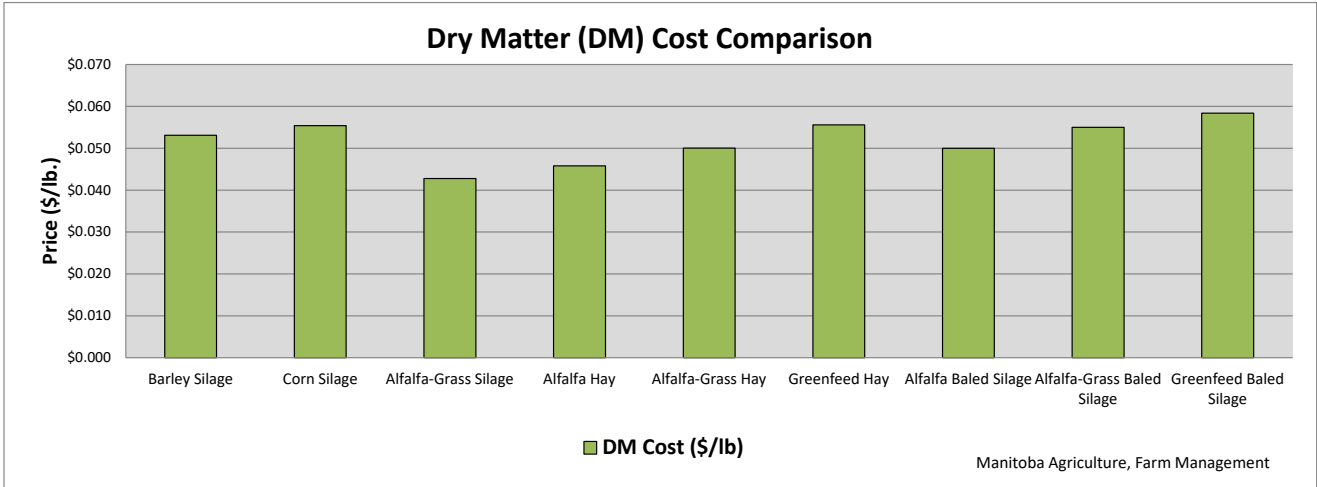
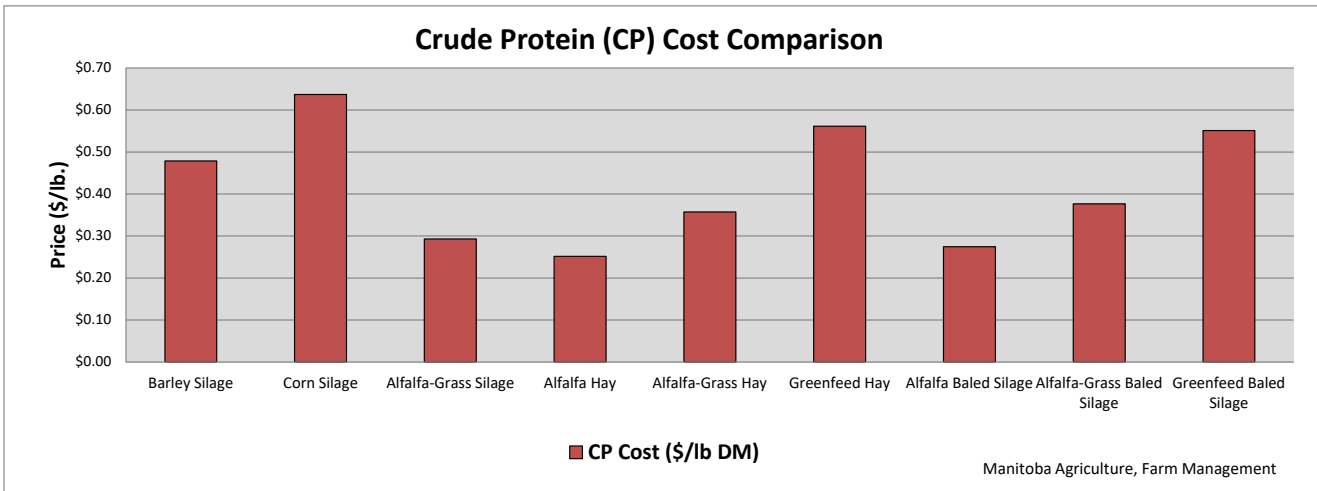
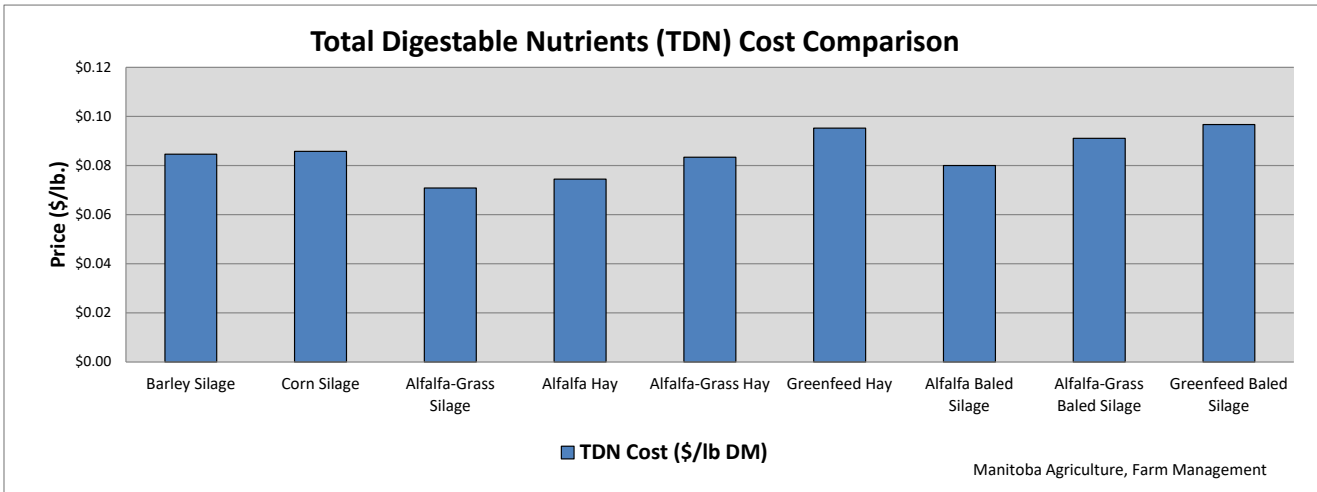
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Analysis of your Agrilinsurance coverage of operating and total costs is an important step in Risk Management Planning for your farm.

Analysis of Agrilinsurance coverage and premium cost is useful in comparing cost efficiency and production cost risk. This is an important step in Risk Management Planning for your farm.





Estimated Yield of Silage - Wet Tons per Acre ¹

<u>Years</u>	<u>Barley tons/acre</u>	<u>Corn tons/acre</u>	<u>Alfalfa-Grass tons/acre</u>	
1	7.50	14.00	4.08	(establishment year)
2	-	-	7.25	
3	-	-	7.25	
4	-	-	6.80	
5	-	-	6.34	
6	-	-	5.89	
7	-	-	5.44	
8	-	-	5.21	
9	-	-		
10	-	-		
Total Yield	-	-	44.2	
Average Yield (tons/acre)	7.50	14.00	6.31	
Avg. Dry Matter Yield (tons/acre)	2.76	4.03	2.73	
Years Production	1	1	7	
Years Rotation	1	1	8	

1. Users are reminded to adjust fertilizer rates when making changes to forage yields.

AgrilInsurance - Individual Coverage	1.00	1.00	1.00
Estimated Storage Loss	5%		

Forage yields are based on Forage Region #6 and Risk Area #14 average yields with an IC of 1.25.

Silage Forage Analysis

	<u>Barley</u>	<u>Corn</u>	<u>Alfalfa-Grass</u>
Crude protein DM (CP)%	11.1	8.7	14.6
Energy DM (TDN) %	62.8	64.6	60.4
As fed moisture %	63.2	71.2	56.8

Silage Price Formula

	<u>Barley</u>	<u>Corn</u>	<u>Alfalfa-Grass</u>
Grain price (per bushel)	\$4.15	\$4.75	-
Dry Hay price (\$ per ton)	-	-	\$150.00
Silage Price Factor	12.00	9.00	0.4976
Silage (\$ per wet ton)	\$49.80	\$42.75	\$74.64

Forage Value Comparison (Feed Analysis)

	<u>Alfalfa/Grass Hay</u>	<u>Alfalfa Hay</u>	<u>Greenfeed</u>
Crude Protein feed analysis %	14.0	18.2	9.9
TDN feed analysis %	60.0	61.5	58.4
Moisture content %	12.6	12.1	14.2

Seed & Treatment

<u>Crop</u>	<u>Seeding Rate</u> <u>per Acre</u>	<u>Price</u> <u>per Unit</u>	<u>Cost</u> <u>per Acre</u>
Cereal Silage			
Barley	2.25 bu	\$7.50 /bu	\$16.88
Corn	32,000 plants	\$0.00290 /plant	\$92.80
Alfalfa-Grass Silage			
Alfalfa-grass	10 lb.	\$3.60 /lb.	\$36.00
Oat nurse crop (silage)	1.25 bu	\$7.25 /bu	\$9.06

Fertilizer ¹

<u>Fertilizer Type</u>	<u>Bulk Price</u> <u>\$/tonne</u>	<u>Actual Nutrient</u> <u>\$/lb.</u>	<u>Nitrogen</u> <u>Usage</u>	<u>Sulphur</u> <u>Usage</u>
Nitrogen: (urea) 46-0-0	\$500	\$0.493	100%	-
Nitrogen: (NH3) 82-0-0	\$790	\$0.437	0%	-
Nitrogen: (liquid) 28-0-0	\$320	\$0.518	0%	-
Phosphorus: 11-52-0	\$615	\$0.432	-	-
Potash: 0-0-60	\$470	\$0.355	-	-
Sulphur: 20.5-0-0-24	\$425	\$0.382	-	100%
MES S15: 13-33-0-15	\$630	\$0.527	-	0%

Amount of Actual Pounds of Elements Applied Per Acre

<u>Crop</u>	<u>Nitrogen</u>		<u>Phosphorus</u>		<u>Potash</u>		<u>Sulphur</u>		<u>Total</u> <u>\$/acre</u>
	<u>lbs.</u>	<u>\$/acre</u>	<u>lbs.</u>	<u>\$/acre</u>	<u>lbs.</u>	<u>\$/acre</u>	<u>lbs.</u>	<u>\$/acre</u>	
Cereal Silage									
Barley	80	\$39.44	30	\$12.97	0	\$0.00	0	\$0.00	\$52.41
Corn	130	\$64.10	50	\$21.61	25	\$8.88	10	\$3.82	\$98.41
Alfalfa-Grass Silage									
Alfalfa-grass	0	\$0.00	40	\$17.29	52	\$18.48	15	\$5.73	\$41.50
Oat nurse crop (silage)	50	\$24.65	50	\$21.61	30	\$10.66	15	\$5.73	\$62.65

The fertilizer recommendation will vary depending on the soil type, climate and crop rotation. Manitoba Agriculture recommends that soil test sampling and analysis be conducted each year to produce a better baseline for fertility. On many Manitoba soil types, potash application can be reduced based on soil test results. Custom soil sampling and analysis typically costs \$1.00 to \$2.00/acre.

1. Users are reminded to adjust silage yields when making changes to fertilizer rates.

Chemicals ¹

<u>Crop</u>	<u>Weed</u> <u>Control</u> <u>\$/acre</u>	<u>Insect</u> <u>Control</u> <u>\$/acre</u>	<u>Forage</u> <u>Removal</u> <u>\$/acre</u>	<u>Total</u> <u>Cost</u> <u>\$/acre</u>
Cereal Silage				
Barley	\$12.00	\$0.00		\$12.00
Corn	\$12.00	\$0.00		\$12.00
Alfalfa-Grass Silage				
Alfalfa-grass	\$0.00	\$0.00		\$0.00
Oat nurse crop (silage)	\$15.00	\$0.00	\$10.00	\$25.00

Guidelines: Silage Production Costs

Fixed Costs			
Land value (\$/acre)	\$2,250	Land cost (\$/acre)	\$51.98
Total Silage acres	300	Machinery Investment (\$/acre)	\$375.00
Depreciation Rate	10.0%		
Investment Rate	2.75%		
Barley Silage Bunker Storage (total cost)	\$10,000	Machinery Depreciation cost (\$/acre)	\$37.50
Corn Silage Bunker Storage (total cost)	\$15,000	Machinery Investment cost (\$/acre)	\$10.31
Alfalfa Silage Bunker Storage (total cost)	\$10,000	Machinery Lease cost (\$/acre)	\$4.80
		Total (\$/acre)	\$52.61

Owned Equipment Inventory and Current Values							
	Market Value	Silage Usage %	Silage Allocation		Market Value	Silage Usage %	Silage Allocation
Power & Misc. Equipment				Harvest Equipment			
4WD Tractor 300HP	\$150,000	10%	\$15,000	Swather 25ft	\$25,000	10%	\$2,500
MFD Tractor 175HP	\$50,000	10%	\$5,000	PT Forage Harvester	\$35,000	100%	\$35,000
	\$0	0%	\$0	PT Forage pickup header	\$5,000	100%	\$5,000
	\$0	0%	\$0	PT Forage corn header	\$10,000	100%	\$10,000
	\$0	0%	\$0	Dump wagon	\$10,000	100%	\$10,000
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
Total			\$20,000	Total			\$62,500

	Market Value	Silage Usage %	Silage Allocation		Market Value	Silage Usage %	Silage Allocation
Seeding, Tillage, Spraying				Trucks & Trailers			
Cultivator	\$25,000	10%	\$2,500	Diesel tandem w/silage box	\$50,000	10%	\$5,000
Harrow 70ft	\$25,000	10%	\$2,500		\$0	0%	\$0
Air tank	\$15,000	10%	\$1,500		\$0	0%	\$0
Air drill 50ft	\$60,000	10%	\$6,000		\$0	0%	\$0
SP sprayer	\$75,000	10%	\$7,500		\$0	0%	\$0
Corn Planter	\$10,000	50%	\$5,000		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
Total	\$210,000		\$25,000	Total			\$5,000

Owned Equipment TOTAL	\$112,500	\$375.00 per acre
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Leased Equipment Inventory							
	Annual Lease	Silage Usage %	Silage Allocation		Annual Lease	Silage Usage %	Silage Allocation
Power & Misc. Equipment				Harvest Equipment			
enter equipment here	\$0	0%	\$0	enter equipment here	\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
Total			\$0	Total			\$0

	Annual Lease	Silage Usage %	Silage Allocation		Annual Lease	Silage Usage %	Silage Allocation
Seeding, Tillage, Spraying				Trucks & Trailers			
enter equipment here	\$0	0%	\$0	1/2 ton pickup	\$9,600	15%	\$1,440
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
	\$0	0%	\$0		\$0	0%	\$0
Total	\$0		\$0	Total			\$1,440

Leased Equipment TOTAL	\$1,440	\$4.80 per acre
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* Leased equipment costs are listed under Operating Costs on the Summary Page.

Other Assumptions

Fuel Costs:

Includes fuel used for field work, and trucking in inputs.

Machinery Operating Costs:

Includes costs for maintenance, repairs, licenses and insurance.

Crop Insurance: (2020 rates)

Forage Region 6 - Establishment Insurance at \$80/ac coverage and annual Select Hay insurance at 80% coverage. Risk Area 14 - Greenfeed Silage and Corn Silage Insurance at 80% coverage.

Miscellaneous Costs:

Includes overhead expenses: silage plastic, hydro, telephone, accounting, buildings, supplies and insurance, etc.

Land Taxes:

The average for the province was based on land tax assessment and mill rates of a sample of municipalities growing crops.

Interest On Operating:

Interest charges on operating costs are calculated at 5.5% for six months.

Land Investment Cost:

Land value are based on approximate average land values. Budget assumed 2.75% return net after tax investment cash value (84%).

Depreciation:

Assumed 10% on machinery, no salvage value.

Investment Cost:

Assumed 2.75% opportunity cost on machinery.

Estimated Farmgate Values:

Silage prices are based on estimated prices for fall/winter 2018/19.

Profitability & Breakeven Analysis:

Gross Revenue = Price per unit x Yield per acre (eg. barley silage: \$49.80/ton x 7.5 ton/ac = \$373.50/ac)

Net Profit = Gross Revenue - Total Cost

(eg. barley silage: \$373.50 gross revenue - \$293.27 total cost = \$80.23 per acre)

Operating Expense Ratio = (Operating Cost / Gross Revenue) x 100

(eg. barley silage: \$152.92 operating expense / \$373.50 gross revenue = 40.9%)

Breakeven Price = Cost / Target Yield (eg. barley silage cost \$293.27 / 7.5 ton = \$39.10 per ton)

Breakeven Yield = Cost / Price per Unit (eg. barley silage cost \$293.27 / \$49.80 ton = 5.89 ton)

Cost of TDN (\$/lb DM) Silage = Total Cost Per Ton / (2000 x silage dry matter% x silage TDN%)

(eg. barley silage cost \$39.1 per ton / (2000 x 36.8% DM x 62.8% TDN) = \$.085 per pound)

Cost of CP (\$/lb DM) Silage = Total Cost Per Ton / (2000 x silage dry matter% x silage CP%)

(eg. barley silage cost \$39.1 per ton / (2000 x 36.8% DM x 11.1% CP) = \$.479 per pound)

Equivalent Dry Hay Value (TDN Basis \$/ton) of silage = 2000 x Hay dry matter% x Hay TDN% x Silage Cost of TDN(\$/lb DM)

(eg. alfalfa grass hay (\$/ton) = 2000 x 87.4% DM x 60% TDN x \$.0846 per pound TDN barley silage (total cost @ \$39.1 per ton) = \$88.73 per ton) If dry hay costs less than \$88.73 per ton, it is a lower cost feed source.)

Equivalent Dry Hay Value (CP Basis \$/ton) of silage = 2000 x Hay dry matter% x Hay CP% x Silage Cost of CP(\$/lb DM)

(eg. alfalfa grass hay (\$/ton) = 2000 x 87.4% DM x 14% CP x \$.4786 per pound TDN barley silage (total cost @ \$39.1 per ton) = \$117.13 per ton) If dry hay costs less than \$117.13 per ton, it is a lower cost feed source.)

Created and maintained by [Manitoba Agriculture Farm Management](#) January, 2020

For more information, contact your local [Manitoba Agriculture Office](#) or:

[Benjamin Hamm](#)
Farm Management Specialist

[Greg Fedak](#)
Farm Management Specialist

[Ray Bittner](#)
Farm Production Extension

[Roy Arnott](#)
A/Manager-Farm Management

[Tod Wallace](#)
Industry Development Specialist, Beef

Contact us

- Go to manitoba.ca/agriculture
- Toll free at 1-844-769-6224
- Email us at mbfarmbusiness@gov.mb.ca
- Follow us on Twitter @MBGovAg
- Visit your local Manitoba Agriculture Office