

# Missouri Crop and Livestock Budgets for 2020

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# Beef Backgrounding Planning Budget

This budget presents information useful to beef farmers. Table 1 presents estimates for the 2020 year for backgrounded steer calves in Missouri. Assumptions were based on price forecasts as of October 2019. Detailed prices and practices are summarized in Tables 2, 3, 4 and 5. The production practices used to develop these cost estimates are common for beef farms in Missouri. Farmers are encouraged to customize this budget to fit their operation.

**Table 1. Missouri beef steer backgrounding planning budget for 2020.**

	Winter backgrounding Per steer <sup>1</sup>	Pasture backgrounding Per steer <sup>1</sup>	Your estimate
<b>Income</b>			
Market steer sales	1,066.26	1,069.11	
Less death loss (1 percent)	10.66	10.69	
<b>Total income</b>	<b>1,055.60</b>	<b>1,058.42</b>	
<b>Operating costs</b>			
Purchased steer	806.00	870.31	
Pasture (rental rate)	0.00	35.83	
Feed, mineral and stored forage	146.31	63.68	
Labor	37.43	22.46	
Veterinary, drugs and supplies	18.00	15.00	
Marketing and hauling	26.66	26.73	
Machinery and utilities	58.94	26.34	
Livestock facility repair	3.75	0.75	
Professional fees (legal, accounting, etc.)	1.00	1.00	
Miscellaneous	3.50	3.50	
Operating interest	14.91	15.12	
<b>Total operating costs</b>	<b>1,116.49</b>	<b>1,080.72</b>	
<b>Ownership costs</b>			
Depreciation on livestock facilities	3.87	0.62	
Interest on livestock facilities	2.98	0.47	
Insurance and taxes on capital items	3.50	2.61	
<b>Total ownership costs</b>	<b>10.34</b>	<b>3.70</b>	
<b>Total costs</b>	<b>1,126.83</b>	<b>1,084.42</b>	
<b>Income over operating costs</b>	<b>-60.89</b>	<b>-22.30</b>	
<b>Income over total costs</b>	<b>-71.23</b>	<b>-25.99</b>	
Pounds of gain per steer purchased	216.85	177.25	
Feed cost per pound gain	0.67	0.56	
Breakeven steer price per pound	1.40	1.41	

<sup>1</sup> Totals may not sum due to rounding.

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**Table 2. Input assumptions used in beef steer winter backgrounding planning budget for 2020.**

Selected input quantities	Per unit	Selected input prices	Dollars per unit
Steer purchase weight, pounds	590	Steer purchase price, per hundredweight	136.61
Market steer sale weight, pounds	815	Market steer sale price, per hundredweight	130.83
Labor, hours per head	2.5	Labor cost, per hour	14.97
Feeding period, days	105		
Average daily gain, pounds	2.14		

**Table 3. Input assumptions used in beef steer pasture backgrounding planning budget for 2020.**

Selected input quantities	Per unit	Selected input prices	Dollars per unit
Steer purchase weight, pounds	590	Steer purchase price, per hundredweight	147.51
Market steer sale weight, pounds	775	Market steer sale price, per hundredweight	137.95
Labor, hours per head	1.5	Labor cost, per hour	14.97
Feeding period, days	105		
Average daily gain, pounds	1.76		

**Table 4. Feed and stored forage in beef steer backgrounding planning budgets for 2020, on a per steer basis.**

Feed description	Cost per unit	Winter backgrounding <sup>1</sup>		Pasture backgrounding <sup>2</sup>	
		Pounds	Dollars	Pounds	Dollars
Mixed hay, per ton	80.00	1,221	48.84		
Corn, per bushel	5.60	754	75.40		
Protein supplement, per ton	200.00	107	10.70	525	52.50
Salt and minerals, per ton	800.00	27	10.80	27	10.80
Limestone, per hundredweight	9.50	6	0.57	4	0.38
<b>Total</b>		<b>2,115</b>	<b>146.31</b>	<b>556</b>	<b>63.68</b>

<sup>1</sup> Winter backgrounding ration assumes 105 days on feed and 2.14 pound average daily gain for a steer.

<sup>2</sup> Pasture backgrounding ration assumes 105 days on feed and 1.76 pound average daily gain for a steer

**Table 5. Machinery assumptions used in beef steer backgrounding planning budgets for 2020.**

Description	Cost per hour	Winter backgrounding <sup>1</sup>		Pasture backgrounding <sup>2</sup>	
		Hours	Dollars	Hours	Dollars
Tractor; 105 MFWD	45.86	25	1,146.50		
Truck	30.00	20	600.00	10	300.00
Livestock trailer	28.00	8	224.00	8	224.00
4-wheeler	10.00	40	400.00	52.5	525.00
<b>Total</b>			<b>2,370.50</b>		<b>1,049.00</b>
<b>Total per steer</b>			<b>56.44</b>		<b>23.84</b>

<sup>1</sup> Machinery needs for winter backgrounding budget are based on 42 steers.

<sup>2</sup> Machinery needs for pasture backgrounding budget are based on 44 steers.

Abbreviations: MFWD = modified front-wheel drive tractor

Farmers can develop custom enterprise budget by using the Missouri Beef Enterprise Tool (<https://extensiondata.missouri.edu/Pro/Beef/Docs/MissouriBeefEnterprise.xlsx>). This spreadsheet tool allows users to make an enterprise budget for a cow-calf (spring or fall calving), heifer or backgrounding (drylot or pasture) operation.



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# Beef Heifer Planning Budget

This budget presents information useful to beef farmers. Table 1 presents estimates for the 2020 year for buying heifer calves and selling as bred replacement heifers in Missouri. Assumptions were based on price forecasts as of October 2019. Detailed assumptions are summarized in Tables 2-4. The production practices used to develop these cost estimates are common for beef farms in Missouri. Farmers are encouraged to customize this budget to fit their operation.

**Table 1. Missouri beef heifer planning budget for 2020.**

	Per heifer sold <sup>1</sup>	Your estimate
<b>Income</b>		
Bred heifer sales (0.875 head)	1,225.00	
Cull heifer sales (0.05 head)	65.00	
Yearling heifer sales (0.075 head)	69.77	
Less death loss (1 percent of heifer sales)	13.60	
<b>Total income</b>	<b>1,364.17</b>	
<b>Operating costs</b>		
Purchased heifer calf	721.00	
Pasture	122.56	
Feed, mineral and stored forage	157.60	
Labor	74.85	
Veterinary, drugs and supplies	30.00	
Marketing costs	40.79	
Breeding costs	37.50	
Machinery and utilities	97.89	
Livestock facility repairs	8.00	
Miscellaneous	6.00	
Operating and calf interest	56.95	
<b>Total operating costs</b>	<b>1,353.15</b>	
<b>Ownership costs</b>		
Depreciation on livestock facilities	8.45	
Interest on livestock facilities	6.77	
Insurance and taxes on capital items	12.81	
<b>Total ownership costs</b>	<b>28.03</b>	
<b>Total costs</b>	<b>1,381.17</b>	
<b>Income over operating costs</b>	<b>-6.97</b>	
<b>Income over total costs</b>	<b>-35.00</b>	
Total cost per head per day (excluding calf price)	1.74	
Total cost per pound of gain	1.57	
Bred heifer breakeven price per head	1,440.92	

<sup>1</sup> Totals may not sum due to rounding.

**Table 2. Input assumptions used in replacement beef heifer planning budget for 2020.**

Selected input quantities	Per unit	Selected input prices	Dollars per unit
Heifer purchase weight, pounds	550	Heifer purchase price, per hundredweight	131.09
Yearling cull heifer sale weight, pounds	750	Yearling cull heifer sale price, per hundredweight	124.04
Heavy cull heifer sale weight, pounds	1,000	Heavy cull heifer sale price, per hundredweight	130.00
Bred heifer sale weight, pounds	1,000	Bred heifer sale price, per head	1,400.00
Labor, hours	5	Labor cost, per hour	14.97
Pasture, animal unit months	8.17	Pasture, per animal unit month	15.00

**Table 3. Feed and stored forage requirements in replacement beef heifer planning budget for 2020, on a per heifer basis.**

Feed description	Cost per unit	November to	May to	October to	Total pounds	Dollars <sup>4</sup>
		May <sup>1</sup>	October <sup>2</sup>	December <sup>3</sup>		
		Pounds	Pounds	Pounds		
Mixed hay, per ton	80.00	1,250			1,250	50.00
Processed corn, per bushel	5.60	240		90	330	33.00
Protein supplement, per ton	200.00	240		90	330	33.00
Salt and minerals, per ton	800.00	49	39	16	104	41.60
<b>Total</b>		<b>1,779</b>	<b>39</b>	<b>196</b>	<b>2,014</b>	<b>157.60</b>

<sup>1</sup> Beginning weight of 550 pounds and ending weight of 750 pounds after a 170 day feeding period.

<sup>2</sup> Beginning weight of 750 pounds and ending weight of 925 pounds after a 150 day feeding period.

<sup>3</sup> Beginning weight of 925 pounds and ending weight of 1,000 pounds after a 60 day feeding period.

<sup>4</sup> Totals may not sum due to rounding.

**Table 4. Machinery assumptions used in replacement beef heifer planning budget for 2020.**

Description	Cost per hour	Hours	Total dollars <sup>1</sup>	Dollars attributed to total heifer operation <sup>2</sup>	Dollars per replacement heifer <sup>3</sup>
Tractor; 105 MFWD	45.86	50	2,293.00	298.09	39.75
Truck	30.00	15	450.00	58.50	7.80
Livestock trailer	28.00	24	672.00	87.36	11.65
4-wheeler	10.00	180	1,800.00	234.00	31.20
<b>Total</b>			<b>5,215.00</b>	<b>677.95</b>	<b>90.39</b>

<sup>1</sup> Total machinery costs are based on combined cow-calf and replacement heifer operation.

<sup>2</sup> 13 percent of the total machinery costs for the beef herd are attributed to the heifer operation.

<sup>3</sup> An average of 7.5 replacement heifers are assumed to be raised yearly in a 50 cow herd.

Abbreviations: MFWD = modified front-wheel drive tractor

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# Northern Missouri Beef Cow-Calf Planning Budget

This budget presents information useful to beef farmers. Table 1 provides estimates for the 2020 year for a cow-calf operation (50-cow herd size and purchased replacements) in Northern Missouri for a fall and spring calving season. Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2, 3 and 4. The production practices used to develop these cost estimates are common for beef farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Northern Missouri beef cow-calf planning budget for 2020.**

	Fall calving Per cow <sup>1</sup>	Spring calving Per cow <sup>1</sup>	Your estimate
<b>Income</b>			
Steer calf sales	379.64	382.29	
Heifer calf sales	311.47	315.07	
Cull cow sales	90.00	105.00	
<b>Total income</b>	<b>781.11</b>	<b>802.37</b>	
<b>Operating costs</b>			
Pasture (rental rate)	138.30	138.30	
Feed and stored forage	217.20	173.45	
Labor	104.79	104.79	
Veterinary, drugs and supplies	38.00	38.00	
Marketing	19.53	20.06	
Machinery and utility costs	106.22	98.24	
Livestock facility repairs	8.00	8.00	
Cow replacement	195.00	225.00	
Bull cost	50.00	50.00	
Professional fees (legal, accounting, etc.)	1.00	1.00	
Miscellaneous expense	6.00	6.00	
Operating interest	19.32	17.91	
<b>Total operating costs</b>	<b>903.35</b>	<b>880.75</b>	
<b>Ownership costs</b>			
Depreciation on facilities and equipment	7.92	7.92	
Interest on breeding stock, facilities and equipment	97.12	98.77	
Insurance/taxes on breeding stock and capital items	33.07	33.37	
<b>Total ownership costs</b>	<b>138.11</b>	<b>140.06</b>	
<b>Total costs</b>	<b>1,041.46</b>	<b>1,020.81</b>	
<b>Income over operating costs</b>	<b>-122.25</b>	<b>-78.38</b>	
<b>Income over total costs</b>	<b>-260.36</b>	<b>-218.44</b>	

<sup>1</sup> Totals may not sum due to rounding.

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**Table 2. Income assumptions used in Northern Missouri beef cow-calf planning budget for 2020.**

Category	Percent	Weight (pounds)	Price per cwt	Calf crop (percent weaned)	Dollars per cow
<b>Fall calving</b>					
Steer	50	580	148.76	88	379.64
Heifers	50	540	131.09	88	311.47
Cull cows	12	1,250	60.00		90.00
<b>Spring calving</b>					
Steer	50	590	152.46	85	382.29
Heifers	50	550	134.79	85	315.07
Cull cows	14	1,250	60.00		105.00

Abbreviations: cwt = hundredweight

**Table 3. Other assumptions used in Northern Missouri beef cow-calf planning budget for 2020.**

Selected input quantities	Per unit	Selected input prices	Dollars per unit
Labor, hours	7	Labor cost, per hour	14.97
Fall calving heifers retained, percent	13	Heifer replacement value, per head	1,500.00
Spring calving heifers retained, percent	15	Bull value, per head	4,000.00

**Table 4. Feed requirements in Northern Missouri beef cow-calf planning budget for 2020, on a per cow basis.**

	Cost per unit	Cow (units)	Calf (units)	Bull <sup>2</sup> (units)	Total units	Total cost per cow <sup>3</sup>
<b>Fall calving</b>						
Pasture, per animal unit equivalent	15.00	8.7 <sup>1</sup>		0.5	9.2	138.30
Harvested forage, per pound	0.035	3,660.0	425.0	200.0	4,285.0	149.98
Protein supplement, per pound	0.100	300.0		7.2	307.2	30.72
Salt and mineral mix, per pound	0.400	91.3			91.3	36.50
					<b>Total</b>	<b>355.50</b>
<b>Spring calving</b>						
Pasture, per animal unit equivalent	15.00	8.7 <sup>1</sup>		0.5	9.2	138.30
Harvested forage, per pound	0.035	3,445.5		200.0	3,645.5	127.59
Protein supplement, per pound	0.100	90.0		3.6	93.6	9.36
Salt and mineral mix, per pound	0.400	91.3			91.3	36.50
					<b>Total</b>	<b>311.75</b>

<sup>1</sup> Cow and calf requirements are combined for pasture animal unit equivalents.

<sup>2</sup> Bull feed units are based on 4 percent of its total need being allocated to cow-calf enterprise.

<sup>3</sup> Totals may not sum due to rounding.

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# Southern Missouri Beef Cow-Calf Planning Budget

This budget presents information useful to beef farmers. Table 1 provides estimates for the 2020 year on a cow-calf operation (50-cow herd size and purchased replacements) in Southern Missouri for a fall and spring calving season. Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2, 3 and 4. The production practices used to develop these cost estimates are common for beef farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Southern Missouri beef cow-calf planning budget for 2020.**

	Fall calving Per cow <sup>1</sup>	Spring calving Per cow <sup>1</sup>	Your estimate
<b>Income</b>			
Steer calf sales	386.18	382.29	
Heifer calf sales	317.24	315.07	
Cull cow sales	82.50	96.25	
<b>Total income</b>	<b>785.92</b>	<b>793.62</b>	
<b>Operating costs</b>			
Pasture (rental rate)	138.30	138.30	
Feed, mineral and stored forage	205.20	173.45	
Labor	119.76	119.76	
Veterinary, drugs and supplies	35.50	35.50	
Marketing	19.65	19.84	
Machinery and utility costs	106.22	98.24	
Livestock facility repairs	8.00	8.00	
Cow replacement	182.00	210.00	
Bull cost	25.00	28.00	
Professional fees (legal, accounting, etc.)	1.00	1.00	
Miscellaneous expense	6.00	6.00	
Operating interest	18.62	17.62	
<b>Total operating costs</b>	<b>865.24</b>	<b>855.71</b>	
<b>Ownership costs</b>			
Depreciation on facilities and equipment	7.92	7.92	
Interest on breeding stock, facilities and equipment	94.20	95.74	
Insurance/taxes on breeding stock and capital items	32.16	32.44	
<b>Total ownership costs</b>	<b>134.27</b>	<b>136.09</b>	
<b>Total costs</b>	<b>999.52</b>	<b>991.81</b>	
<b>Income over operating costs</b>	<b>-79.33</b>	<b>-62.10</b>	
<b>Income over total costs</b>	<b>-213.60</b>	<b>-198.19</b>	

<sup>1</sup> Totals may not sum due to rounding.



**Table 2. Income assumptions used in Southern Missouri beef cow-calf planning budget for 2020.**

Category	Percent	Weight (pounds)	Price per cwt	Calf crop (percent weaned)	Dollars per cow
<b>Fall calving</b>					
Steer	50	590	148.76	88	386.18
Heifers	50	550	131.09	88	317.24
Cull cows	12	1,250	55.00		82.50
<b>Spring calving</b>					
Steer	50	590	152.46	85	382.29
Heifers	50	550	134.79	85	315.07
Cull cows	14	1,250	55.00		96.25

Abbreviations: cwt = hundredweight

**Table 3. Other assumptions used in Southern Missouri beef cow-calf planning budget for 2020.**

Selected input quantities	Per unit	Selected input prices	Dollars per unit
Labor, hours	8	Labor cost, per hour	14.97
Fall calving heifers retained, percent	13	Heifer replacement value, per head	1,400.00
Spring calving heifers retained, percent	15	Bull value, per head	3,000.00

**Table 4. Feed requirements in Southern Missouri beef cow-calf planning budget for 2020, on a per cow basis.**

	Cost per unit	Cow (units)	Calf (units)	Bull <sup>2</sup> (units)	Total units	Total cost per cow <sup>3</sup>
<b>Fall calving</b>						
Pasture, per animal unit equivalent	15.00	8.7 <sup>1</sup>		0.5	9.2	138.30
Harvested forage, per pound	0.035	3,660.0	425.0	200.0	4,285.0	149.98
Protein supplement, per pound	0.100	180.0		7.2	187.2	18.72
Salt and mineral mix, per pound	0.400	91.3			91.3	36.50
					<b>Total</b>	<b>343.50</b>
<b>Spring calving</b>						
Pasture, per animal unit equivalent	15.00	8.7 <sup>1</sup>		0.5	9.2	138.30
Harvested forage, per pound	0.035	3,445.5		200.0	3,645.5	127.59
Protein supplement, per pound	0.100	90.0		3.6	93.6	9.36
Salt and mineral mix, per pound	0.400	91.3			91.3	36.50
					<b>Total</b>	<b>311.75</b>

<sup>1</sup> Cow and calf requirements are combined for pasture animal unit equivalents.

<sup>2</sup> Bull feed units are based on 4 percent of its total need being allocated to cow-calf enterprise.

<sup>3</sup> Totals may not sum due to rounding.

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# Yearling Beef Steer Feeding Planning Budget

This budget presents information useful to beef farmers. Table 1 presents estimates for yearling beef steers in Missouri that were purchased in November 2019 and sold in April 2020 (5 month feeding period with a 3.65 average daily gain). Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common for beef farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Missouri yearling beef steer feeding planning budget.**

	Per steer sold <sup>1</sup>	Your estimate
<b>Income</b>		
Market steer sales	1,625.00	
Less death loss (2 percent)	-32.50	
<b>Total income</b>	<b>1,592.50</b>	
<b>Operating costs</b>		
Purchased steer calf	1,162.50	
Purchased feed	322.75	
Labor	27.00	
Veterinary and drugs	11.75	
Commission, yardage, and hauling	26.00	
Machinery and feed preparation	8.00	
Utilities	5.00	
Operating interest	30.93	
<b>Total operating costs</b>	<b>1,592.93</b>	
<b>Ownership costs</b>		
Depreciation and interest on real estate	5.00	
Real estate and property taxes	4.00	
<b>Total ownership costs</b>	<b>9.00</b>	
<b>Total costs</b>	<b>1,601.93</b>	
<b>Income over operating costs</b>	<b>-0.43</b>	
<b>Income over total costs</b>	<b>-9.43</b>	

<sup>1</sup> Totals may not sum due to rounding.

**Table 2. Assumptions in Missouri yearling beef steer feeding planning budget.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Steer purchase weight, pounds	750	Steer purchase price, per hundredweight	155.00
Market steer sale weight, pounds	1,300	Market steer sale price, per hundredweight	125.00
Labor, hours	2	Labor cost, per hour	13.50
Operating interest, percent	6		

**Table 3. Feed requirements per steer in Missouri yearling beef steer feeding planning budget.**

<b>Feed description</b>	<b>Cost per unit</b>	<b>Total pounds<sup>1</sup></b>	<b>Dollars</b>
Corn, per bushel	3.80	2,240	152.00
Distiller grains, dry, per ton	175.00	1,500	131.25
Soybean meal, per ton	320.00	100	16.00
Salt and additives, per ton	400.00	30	6.00
Grass hay, per ton	65.00	500	17.50
<b>Total</b>		<b>4,370</b>	<b>322.75</b>

<sup>1</sup>Ration assumes 151 days on feed and 3.65 pound average daily gain for a steer.

# Feeder Pigs Planning Budget

This budget presents information useful to swine farmers. Table 1 presents estimates for a feeder pig operation in Missouri with a production system of 22 pigs per sow per year and pigs sold at 40 pounds each. Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common for swine farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Missouri feeder pigs planning budget for 2020.**

	Per sow <sup>1</sup>	Your estimate
<b>Income</b>		
Feeder pigs sold (22 head)	1,223	
Cull sows sold (0.5 head)	76	
<b>Total income</b>	<b>1,299</b>	
<b>Operating costs</b>		
Purchased feed	430	
Labor	162	
Veterinary and medicine	60	
Breeding and replacement gilts	235	
Equipment operation, machine hire, and transportation	64	
Utilities, insurance and miscellaneous	72	
Personal property taxes	5	
Hog facility repair and maintenance	51	
Operating interest	28	
<b>Total operating costs</b>	<b>1,107</b>	
<b>Ownership costs</b>		
Real estate interest, depreciation, and taxes	107	
Interest on breeding herd	16	
Machinery and equipment interest and depreciation	64	
<b>Total ownership costs</b>	<b>187</b>	
<b>Total costs</b>	<b>1,294</b>	
<b>Income over operating costs</b>	<b>193</b>	
<b>Income over total costs</b>	<b>6</b>	

<sup>1</sup> Totals may not sum due to rounding.

**Table 2. Assumptions used in Missouri feeder pigs planning budget for 2020.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Feeder pig sale weight, pounds	40	Feeder pig sale price, per hundredweight	139.00
Cull sow sale weight, pounds	400	Cull sow sale price, per hundredweight	38.00
Labor, hours per sow	12	Labor cost, per hour	13.50
Operating interest, percent	6		

**Table 3. Feed requirements used in Missouri feeder pigs planning budget for 2020, on a per sow basis.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Commercial feed, pounds	1,458	Commercial feed price, per ton	330.00
Grain and distiller's dried grains, pounds	2,708	Grain and distiller's dried grains price, per ton	140.00

# Farrow to Finish Swine Planning Budget

This budget presents information useful to swine farmers. Table 1 presents estimates for a farrow to finish operation in Missouri with production of 22 pigs per sow per year and selling market hogs at 280 pounds. Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common for swine farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Missouri farrow to finish swine planning budget for 2020.**

	Per sow <sup>1</sup>	Your estimate
<b>Income</b>		
Market hogs sold (22 head)	3,511	
Cull sows sold (0.5 head)	76	
<b>Total income</b>	<b>3,587</b>	
<b>Operating costs</b>		
Purchased feed	1,722	
Labor	270	
Veterinary and medicine	122	
Breeding and replacement gilts	235	
Equipment operation, machine hire, and transportation	133	
Utilities, insurance and miscellaneous	128	
Personal property taxes	6	
Hog facility repair and maintenance	108	
Operating interest	74	
<b>Total operating costs</b>	<b>2,797</b>	
<b>Ownership costs</b>		
Real estate interest, depreciation, and taxes	220	
Interest on breeding herd	18	
Machinery and equipment interest and depreciation	118	
<b>Total ownership costs</b>	<b>356</b>	
<b>Total costs</b>	<b>3,153</b>	
<b>Income over operating costs</b>	<b>790</b>	
<b>Income over total costs</b>	<b>434</b>	

<sup>1</sup> Totals may not sum due to rounding.

**Table 2. Assumptions used in Missouri farrow to finish swine planning budget for 2020.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Market hog sale weight, pounds	280	Market hog sale price, per hundredweight	57.00
Cull sow sale weight, pounds	400	Cull sow sale price, per hundredweight	38.00
Labor, hours per sow	20	Labor cost, per hour	13.50
Operating interest, percent	6		

**Table 3. Feed requirements used in Missouri farrow to finish swine planning budget for 2020, on a per sow basis.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Commercial feed, pounds	4,022	Commercial feed price, per ton	330.00
Grain and distiller's dried grains, pounds	15,115	Grain and distiller's dried grains price, per ton	140.00

# Hog Finishing Planning Budget

This budget presents information useful to swine farmers. Table 1 presents estimates for a hog finishing operation in Missouri that purchases 103 head of 40 pound pigs and sells 100 head of 280 pound market hogs. Assumptions were based on price forecasts as of October 2019. Detailed assumptions and feed requirements are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common for swine farms in Missouri. Farmers are encouraged to modify this budget to fit their operation.

**Table 1. Missouri hog finishing planning budget for 2020.**

	Per lot of 100 hogs <sup>1</sup>	Your estimate
<b>Income</b>		
Market hogs sold (100 head)	15,960	
<b>Total income</b>	<b>15,960</b>	
<b>Operating costs</b>		
Purchased pigs	5,727	
Purchased feed	5,351	
Labor	527	
Veterinary and medicine	455	
Livestock materials and services	25	
Equipment operation, machine hire, and transportation	530	
Utilities, insurance and miscellaneous	329	
Personal property taxes	25	
Hog facility repair and maintenance	193	
Operating interest	95	
<b>Total operating costs</b>	<b>13,256</b>	
<b>Ownership costs</b>		
Real estate interest, depreciation, and taxes	604	
Machinery and equipment interest and depreciation	367	
<b>Total ownership costs</b>	<b>971</b>	
<b>Total costs</b>	<b>14,227</b>	
<b>Income over operating costs</b>	<b>2,704</b>	
<b>Income over total costs</b>	<b>1,733</b>	

<sup>1</sup> Totals may not sum due to rounding.



**Table 2. Assumptions used in Missouri hog finishing planning budget for 2020.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Market hog sale weight, hundredweight	280	Market hog sale price, per hundredweight	57.00
Pig purchase weight, pounds	40	Pig purchase price, per pound	1.39
Labor, hours per lot	39	Labor cost, per hour	13.50
Operating interest, percent	6		

**Table 3. Feed requirements used in Missouri hog finishing planning budget for 2020, on a per lot (100 hogs) basis.**

<b>Selected input quantities</b>	<b>Per unit</b>	<b>Selected input prices</b>	<b>Dollars per unit</b>
Commercial feed, pounds	10,159	Commercial feed price, per ton	330.00
Grain and distiller's dried grains, pounds	52,500	Grain and distiller's dried grains price, per ton	140.00

# Dairy (Confinement) Planning Budget

This budget presents information useful to dairy farmers. Table 1 presents estimates for the 2020 year on a 150-cow confinement dairy (replacements raised on farm) in Missouri. Assumptions were based on price forecasts as of October 2019. Detailed inputs, feed requirements and investments are summarized in Tables 2, 3 and 4. The production practices used to develop these cost estimates are common for confinement dairies in Missouri. Farmers are encouraged to customize this budget to fit their operation.

**Table 1. Missouri dairy (confinement) planning budget for 2020.**

	20,000 pounds milk sold		24,000 pounds milk sold		Your estimate
	Dollars per cow <sup>1</sup>	Dollars per cwt <sup>1</sup>	Dollars per cow <sup>1</sup>	Dollars per cwt <sup>1</sup>	
<b>Income</b>					
Milk sales	3,699.96	18.50	4,439.93	18.50	
Bull and surplus heifer sales	52.70	0.26	52.70	0.22	
Hedging and insurance	0.00	0.00	0.00	0.00	
Cull cow sales	234.90	1.17	234.90	0.98	
<b>Total income</b>	<b>3,987.56</b>	<b>19.94</b>	<b>4,727.53</b>	<b>19.70</b>	
<b>Operating costs</b>					
Feed	1,979.41	9.90	2,190.24	9.13	
Labor	492.61	2.46	492.61	2.05	
Veterinary, drugs and supplies	110.63	0.55	115.00	0.48	
Utilities and water	55.00	0.28	70.00	0.29	
Fuel, oil and vehicle	64.13	0.32	64.13	0.27	
Milk hauling and promotion	200.00	1.00	240.00	1.00	
Building and equip. repair	210.28	1.05	210.28	0.88	
Breeding/genetic charges	54.00	0.27	54.00	0.23	
Professional fees (legal, accounting, etc.)	11.00	0.06	11.00	0.05	
Miscellaneous and insurance	28.40	0.14	34.08	0.14	
Operating interest	82.65	0.41	89.14	0.37	
<b>Total operating costs</b>	<b>3,288.11</b>	<b>16.44</b>	<b>3,570.48</b>	<b>14.88</b>	
<b>Ownership costs</b>					
Depreciation on buildings and equip.	370.81	1.85	370.81	1.55	
Interest on land, buildings and equip.	183.19	0.92	183.19	0.76	
Interest on breeding stock	60.50	0.30	60.50	0.25	
Insurance/tax on capital items	106.78	0.53	106.78	0.44	
<b>Total ownership costs</b>	<b>721.29</b>	<b>3.61</b>	<b>721.29</b>	<b>3.01</b>	
<b>Total costs</b>	<b>4,009.40</b>	<b>20.05</b>	<b>4,291.77</b>	<b>17.88</b>	
<b>Income over operating costs</b>	<b>699.44</b>	<b>3.50</b>	<b>1,157.05</b>	<b>4.82</b>	
<b>Income over total costs</b>	<b>-21.84</b>	<b>-0.11</b>	<b>435.77</b>	<b>1.82</b>	

<sup>1</sup> Totals may not sum due to rounding.

Abbreviations: cwt = hundredweight; equip. = equipment

Written by **Joe Horner** and **Ryan Milhollin**, Agricultural Business State Specialists

**Table 2. Input assumptions used in dairy (confinement) planning budget for 2020.**

Selected input quantities	Quantity	Selected input prices	Dollars per unit
Cull cow sale weight, pounds	1,450	Cull cow sale price, per hundredweight	60.00
Labor, cows per worker	70	Annual labor salary and benefits, per worker	40,000.00
Calf crop, percent	95	Bull calf sale price, per head	85.00
Heifer replacement, percent	33	Surplus heifer calf sale price, per head	85.00
Operating interest, percent	5.5	Milk price, per hundredweight	18.50

**Table 3. Feed requirements used in dairy (confinement) planning budget for 2020, on a per cow basis.**

Feed description	Cost per unit	20,000 pounds milk sold		24,000 pounds milk sold	
		Pounds	Dollars <sup>2</sup>	Pounds	Dollars <sup>2</sup>
Corn silage, per ton	37.50	12,223	229.19	13,357	250.45
Alfalfa baleage, per ton	100.00	3,741	187.05	5,296	264.79
Corn, ground, per bushel	3.75	3,470	232.37	3,658	244.92
Alfalfa hay, per ton	200.00	1,708	170.78	1,934	193.41
Whole cotton seed, per ton	230.00	1,675	192.66	1,897	218.18
Soybean hulls, per ton	165.00	1,125	92.78	752	62.03
Soybean meal, per ton	335.00	1,095	183.38	1,354	226.87
Distillers grain, dry, per ton	175.00	1,005	87.95	949	83.01
Grass hay, per ton	80.00	914	36.54	914	36.54
Minerals/vitamins, per ton	1,100.00	577	317.38	656	360.72
Total lactating and dry cow feed cost			1,730.09		1,940.92
Replacement heifer feed and forage cost <sup>1</sup>			249.32		249.32
<b>Total feed cost per cow</b>			<b>1,979.41</b>		<b>2,190.24</b>

<sup>1</sup> Total replacement heifer (0 to 24 months) feed cost is \$755.51 and was adjusted to a 33% heifer replacement rate.

<sup>2</sup> Totals may not sum due to rounding.

**Table 4. Investment assumptions in dairy (confinement) planning budget for 2020.**

Description	Quantity	Dollars per unit	Total dollars	Dollars per cow <sup>2</sup>
Land, acres	4	3,000	12,000	80
Milking parlor, stalls	12	27,500	330,000	2,188
Breeding herd, cows	150	1,100	165,800	1,100
Free stall barn, stalls	130	2,539	330,000	2,188
Feed storage			55,426	368
Manure storage system			97,500	647
Equipment			81,100	538
<b>Total<sup>1</sup></b>			<b>1,071,906</b>	<b>7,108</b>

<sup>1</sup> Totals may not sum due to rounding.

<sup>2</sup> Represents total cows in herd.

Farmers can also develop their own custom budget by using the Missouri Dairy Enterprise Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/MODairyBudget.xlsx>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for dairy production and heifer raising in Missouri.



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# Dairy (Grazing) Planning Budget

This budget presents information useful to dairy farmers. Table 1 presents estimates for the 2020 year on a 150-cow rotational grazing dairy (replacements raised on farm) in Missouri. Assumptions were based on price forecasts as of October 2019. Detailed inputs, feed requirements and investments are summarized in Tables 2, 3 and 4. The production practices used to develop these cost estimates are common for grazing dairies in Missouri. Farmers are encouraged to customize this budget to fit their operation.

**Table 1. Missouri dairy (grazing) planning budget for 2020.**

	11,000 pounds milk sold		14,000 pounds milk sold		Your estimate
	Dollars per cow <sup>1</sup>	Dollars per cwt <sup>1</sup>	Dollars per cow <sup>1</sup>	Dollars per cwt <sup>1</sup>	
<b>Income</b>					
Milk sales	2,035.04	18.50	2,590.06	18.50	
Bull and surplus heifer sales	63.75	0.58	63.75	0.46	
Hedging and insurance	0.00	0.00	0.00	0.00	
Cull cow sales	118.80	1.08	118.80	0.85	
<b>Total income</b>	<b>2,217.59</b>	<b>20.16</b>	<b>2,772.61</b>	<b>19.80</b>	
<b>Operating costs</b>					
Feed	907.82	8.25	978.13	6.99	
Labor	333.33	3.03	333.33	2.38	
Veterinary, drugs and supplies	85.00	0.77	95.00	0.68	
Utilities and water	50.00	0.45	50.00	0.36	
Fuel, oil and vehicle	59.06	0.54	59.06	0.42	
Milk hauling and promotion	110.00	1.00	140.00	1.00	
Building and equipment repair	142.52	1.30	142.52	1.02	
Breeding/genetic charges	54.00	0.49	54.00	0.39	
Professional fees (legal, accounting, etc.)	11.00	0.10	11.00	0.08	
Miscellaneous and insurance	15.62	0.14	19.88	0.14	
Operating interest	45.60	0.41	47.93	0.34	
<b>Total operating costs</b>	<b>1,813.96</b>	<b>16.49</b>	<b>1,930.86</b>	<b>13.79</b>	
<b>Ownership costs</b>					
Depreciation on buildings and equip.	105.71	0.96	105.71	0.76	
Interest on land, buildings and equip.	226.21	2.06	226.21	1.62	
Interest on breeding stock	60.50	0.55	60.50	0.43	
Insurance/taxes on capital items	49.89	0.45	49.89	0.36	
<b>Total ownership costs</b>	<b>442.31</b>	<b>4.02</b>	<b>442.31</b>	<b>3.16</b>	
<b>Total costs</b>	<b>2,256.27</b>	<b>20.51</b>	<b>2,373.17</b>	<b>16.95</b>	
<b>Income over operating costs</b>	<b>403.63</b>	<b>3.67</b>	<b>841.74</b>	<b>6.01</b>	
<b>Income over total costs</b>	<b>-38.67</b>	<b>-0.35</b>	<b>399.44</b>	<b>2.85</b>	

<sup>1</sup> Totals may not sum due to rounding.

Abbreviations: cwt = hundredweight; equip. = equipment

Written by **Joe Horner** and **Ryan Milhollin**, Agricultural Business State Specialists

**Table 2. Input assumptions used in dairy (grazing) planning budget for 2020.**

Selected input quantities	Quantity	Selected input prices	Dollars per unit
Cull cow sale weight, pounds	1,100	Cull cow sale price, per hundredweight	60.00
Labor, cows per worker	100	Annual labor salary and benefits, per worker	40,000.00
Calf crop, percent	95	Bull calf sale price, per head	85.00
Heifer replacement, percent	20	Surplus heifer calf sale price, per head	85.00
Operating interest, percent	6	Milk price, per hundredweight	18.50

**Table 3. Feed requirements in dairy (grazing) planning budget for 2020, on a per cow basis.**

Feed description	Cost per unit	11,000 pounds milk sold		14,000 pounds milk sold	
		Pounds	Dollars <sup>2</sup>	Pounds	Dollars <sup>2</sup>
Pasture (intensive dairy), dry matter per ton	80.00	7,335	293.41	7,658	306.31
Alfalfa hay, per ton	200.00	1,289	128.94	1,289	128.94
Corn, cracked, per bushel	3.75	910	60.94	1,384	92.70
Soybean hulls, per ton	165.00	910	75.08	1,068	88.12
Distillers grain, dry, per ton	175.00	791	69.17	949	83.01
Grass hay, per ton	80.00	670	26.80	639	25.58
Minerals/vitamins, per ton	1,100.00	186	102.38	186	102.38
Total lactating and dry cow feed cost			756.71	827.03	
Replacement heifer feed and forage cost <sup>1</sup>			151.10	151.10	
<b>Total feed cost per cow</b>			<b>907.82</b>	<b>978.13</b>	

<sup>1</sup> Total replacement heifer (0 to 24 months) feed cost is \$755.51 and was adjusted to a 20% heifer replacement rate.

<sup>2</sup> Totals may not sum due to rounding.

**Table 4. Investment assumptions in dairy (grazing) planning budget for 2020.**

Description	Quantity	Dollars per unit	Total dollars	Dollars per cow <sup>2</sup>
Land, acres	200	3,000	600,000	3,333
Milking parlor, stalls	24	7,000	168,000	933
Breeding herd, cows	180	1,100	198,000	1,100
Working facility			14,800	82
Feed storage			10,080	56
Manure storage system			31,250	174
Equipment			31,000	172
<b>Total<sup>1</sup></b>			<b>1,053,130</b>	<b>5,851</b>

<sup>1</sup> Totals may not sum due to rounding.

<sup>2</sup> Represents total cows in herd.

Farmers can also develop their own custom budget by using the Missouri Dairy Enterprise Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/MODairyBudget.xlsx>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for dairy production and heifer raising in Missouri.

# Dairy Heifer Planning Budget

This budget presents information useful to farmers raising dairy heifers. Table 1 presents estimates for the 2020 year for dairy calves purchased at birth, bred and sold at 24 months in Missouri. Assumptions were based on price forecasts as of October 2019. Detailed inputs and feed requirements are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to customize this budget to fit their operation.

**Table 1. Missouri dairy heifer planning budget for 2020.**

	Per heifer sold <sup>1</sup>	Your estimate
<b>Income</b>		
Springer heifer sales (0.95 head)	1,045.00	
Cull heifer sales (0.025 head)	32.50	
Yearling heifer sales (0.025 head)	18.13	
Less death loss (4 percent) of purchased calves	-3.40	
<b>Total income</b>	<b>1,092.23</b>	
<b>Operating costs</b>		
Purchased heifer calf and interest	94.72	
Feed (birth to 24 months of age)	755.51	
Labor	149.70	
Veterinary, drugs and supplies	25.00	
Breeding costs for artificial insemination services	45.00	
Transportation and marketing	15.00	
Utilities, fuel and oil	18.75	
Building and equipment repairs	9.68	
Miscellaneous	15.00	
Operating interest	28.42	
<b>Total operating costs</b>	<b>1,156.78</b>	
<b>Ownership costs</b>		
Depreciation on buildings and equipment	52.09	
Interest on buildings and equipment	29.27	
Insurance and taxes on buildings and equipment	14.08	
<b>Total ownership costs</b>	<b>95.44</b>	
<b>Total costs</b>	<b>1,252.22</b>	
<b>Income over operating costs</b>	<b>-64.56</b>	
<b>Income over total costs</b>	<b>-160.00</b>	
Total cost per day per heifer sold	1.61	
Total cost per pound of gain per heifer sold	0.97	
Springer heifer breakeven price per head	1,268.42	

<sup>1</sup> Totals may not sum due to rounding.

**Table 2. Input assumptions used in dairy heifer planning budget for 2020.**

Selected input quantities	Quantity	Selected input prices	Dollars per unit
Cull heifer sale weight, pounds	1,300	Cull and yearling heifer sale price, per pound	1.00
Yearling heifer sale weight, pounds	725	Springer heifer sale price, per head	1,100.00
Labor, hours	10	Labor cost, per hour	14.97
		Heifer purchase price	85.00

**Table 3. Feed requirements for dairy heifer planning budget for 2020.**

Birth to 6 months (90 to 400 pounds)		Pre-weaning ration (90 to 180 pounds)		Transition ration (180 to 235 pounds)		Early growing ration (235 to 400 pounds)	
Feed description	Cost per unit	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>
Milk replacer, per pound	1.275	50	63.75				
Calf starter, per pound	0.150	100	15.00	100	15.00		
Alfalfa hay, per pound	0.100	20	2.00	90	9.00	225	22.50
Calf grower, per pound	0.130			50	6.50	450	58.50
Grass hay, per pound	0.040					225	9.00
Pasture, per animal unit month	15.00					0.4	6.13
<b>Feed cost per period</b>			<b>80.75</b>		<b>30.50</b>		<b>96.13</b>
<b>Total feed costs<sup>2</sup></b>			<b>207.38</b>				
6 to 12 months (400 to 725 pounds)		Winter ration		Spring/Fall ration		Summer ration	
Feed description	Cost per unit	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>
Corn gluten feed, per pound	0.0840	525	44.10			270	22.68
Corn, cracked, per pound	0.0670	387	25.92	252	16.88	234	15.67
Soybean hulls, per pound	0.0825	263	21.66	360	29.70	270	22.28
Grass hay, per pound	0.0400	1,350	54.00				
Mineral, per pound	0.5375	36	19.35	36	19.35	36	19.35
Pasture, per animal unit month	15.00			1.1	16.88	1.7	25.31
<b>Feed cost per period</b>			<b>165.02</b>		<b>82.80</b>		<b>105.29</b>
<b>Average total feed costs</b>			<b>217.95</b>				
12 to 24 months (725 to 1,380 pounds)		Winter ration		Spring/Fall ration		Summer ration	
Feed description	Cost per unit	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>	Units	Dollars <sup>1</sup>
Corn gluten feed, per pound	0.0840	225	18.90			207	17.39
Corn, cracked, per pound	0.0670	135	9.04	90	6.03	117	7.83
Soybean hulls, per pound	0.0825	90	7.43	180	14.85	207	17.08
Grass hay, per pound	0.0400	1,710	68.40				
Mineral, per pound	0.5375	18	9.68	18	9.68	18	9.68
Pasture, per animal unit month	15.00			2.1	31.58	3.2	47.36
<b>Feed cost per period</b>			<b>113.44</b>		<b>62.13</b>		<b>99.34</b>
<b>Average total feed costs<sup>3</sup></b>			<b>337.03</b>				

<sup>1</sup> Totals may not sum due to rounding.

<sup>2</sup> Feed cost adjusted to account for death loss (4 percent).

<sup>3</sup> Feed cost adjusted to account for sale of yearling heifers (2.5 percent).

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# Early Kidding, Sell at Weaning Planning Budget

**Table 1. Missouri meat goat planning budget for 2020: Early kidding, sell at weaning.**

	Head per doe	Quantity	Unit	Dollars per unit	Dollars per doe	Your estimate
<b>Returns per doe per year</b>						
Kids	1.17	50	pounds	2.91	170.24	
Culled does	0.14	125	pounds	0.85	14.88	
Total returns					<b>185.11</b>	
<b>Operating costs per doe</b>						
Doe replacement	0.17		head	185.00	31.45	
Buck net cost, breeding supplies	0.04		head	308.00	4.08	
Pasture		0.46	acres	33.00	15.28	
Hay		360	pounds	0.043	15.30	
Supplement		36	pounds	0.109	3.94	
Mineral		8.2	pounds	0.360	2.94	
Animal health					5.86	
Guard dog replacement and food					4.40	
Bedding and stock supplies					1.63	
Marketing					14.03	
Custom hire					0.00	
Machinery fuel, lube, repair					16.69	
Facility maintenance					3.60	
Operating interest		5.5	percent		3.04	
Operator and hired labor		3.95	hour	13.50	53.35	
Total operating costs					<b>175.60</b>	
<b>Ownership costs per doe</b>						
Business overhead (professional fees, utilities, miscellaneous)					2.25	
Property taxes and insurance					3.62	
Economic depreciation, facility and equipment					17.95	
Interest on annualized capital investment		5.5	percent		22.89	
Total ownership costs					46.71	
<b>Total costs per doe</b>					<b>222.31</b>	
<b>Return over operating costs, per doe</b>					9.51	
<b>Return over total costs, per doe</b>					-37.20	
					Return to labor and management, per doe	16.15
					Shut-down kid price, all else equal, \$ per pound	2.75
					Break-even kid price, all else equal, \$ per pound	3.55

Written by  
**Jennifer Lutes**, County Engagement Specialist in Agriculture and Environment



**Table 2. Production rates for 2020: Early kidding, sell at weaning**

Rates	Quantity
Kiddings, per doe per year	1
Doe numbers, start of breeding season	100
Bucks for breeding	4
Kid crop (live birth per exposed), percent	130
Kid crop (raised to sale weight), percent	117
Adult death loss, percent	3
Kid death loss, pre-weaning, percent	10
Kid death loss, post-weaning, percent	0

**Table 3. Feed and labor estimates for 2020: Early kidding, sell at weaning**

	Units	Units per head, adults	Units per head, kids	Total units per doe	Weighted price (dollars per unit)	Total dollars per doe
Pasture	acres	0.330	0.100	0.46	33.00	15.28
Hay	pounds	346.1		360	0.043	15.30
Supplement	pounds	33.4	1.2	36.3	0.109	3.94
Mineral	pounds	7.9	0.6	8.2	0.36	2.94
Labor	hours	3.8		3.95	13.50	53.35

**Table 4. Land and capital investment estimates for 2020: Early kidding, sell at weaning**

	Units	Quantity	Dollars per unit	Enterprise total dollars	Dollars per doe
Pastureland	acres	46	2,200	101,900	1,019
Breeding stock unit	does	100	202	20,235	202
Buildings and facilities				21,000	210
Machinery, equipment, and pickup				14,000	140
Total				157,135	1,571

Note: Building and machinery investment is allocated across multiple enterprises.

This doe flock budget shows economic costs and returns estimates for a production system birthing kids in the winter (late December and January). Kids are sold at weaning for the spring holiday market. This common management system takes advantage of expected seasonally high prices for kids and has a low land requirement. However, it also has relatively high production risk due to breeding challenges and winter kidding, in addition to higher winter feeding costs. Users may customize this budget for their own purposes using the macro-enabled spreadsheet available at <https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/EarlyKiddingGoatBudget.xlsx>.

# Early Lambing, Sell at Weaning Planning Budget

**Table 1. Missouri sheep flock planning budget for 2020: Early lambing, sell at weaning.**

	Head per ewe	Quantity	Unit	Dollars per unit	Dollars per ewe	Your estimate
<b>Returns per ewe per year</b>						
Lambs	1.44	67.5	pounds	2.11	204.89	
Culled ewes	0.17	170	pounds	0.55	15.90	
Wool	1.04	8	pounds	0.50	4.16	
Total returns					<b>224.94</b>	
<b>Operating costs per ewe</b>						
Ewe replacement	0.20		head	200.00	40.00	
Ram net cost, breeding supplies	0.04		head	579.00	14.72	
Pasture		0.36	acres	45.00	16.38	
Hay		420	pounds	0.061	25.48	
Supplement		29	pounds	0.118	3.39	
Mineral		8.1	pounds	0.45	3.64	
Animal health					7.57	
Guard dog replacement and food					10.67	
Bedding and stock supplies					3.88	
Marketing					12.23	
Shearing and other custom hire					5.46	
Machinery fuel, lube, repair					14.67	
Facility maintenance					3.60	
Operating interest		5.5	percent		3.93	
Operator and hired labor		3.95	hour	15.00	59.28	
Total operating costs					<b>224.89</b>	
<b>Ownership costs per ewe</b>						
Business overhead (professional fees, utilities, miscellaneous)					2.25	
Property taxes and insurance					3.22	
Economic depreciation, facility and equipment					17.08	
Interest on annualized capital investment		5.5	percent		23.96	
Total ownership costs					46.51	
<b>Total costs per ewe</b>					<b>271.40</b>	
<b>Return over operating costs, per ewe</b>					0.05	
<b>Return over total costs, per ewe</b>					-46.46	
					Return to labor and management, per ewe	12.82
					Shut-down lamb price, all else equal, \$ per pound	2.11
					Break-even lamb price, all else equal, \$ per pound	2.59

Written by  
**Brent Carpenter**, Agricultural Business Field Specialist

**Table 2. Production rates for 2020: Early lambing, sell at weaning**

Rates	Quantity
Lambings, per ewe per year	1
Ewe numbers, start of breeding season	100
Rams for breeding	4
Lamb crop (live birth per exposed), percent	158
Lamb crop (raised to sale weight), percent	144
Adult death loss, percent	3
Lamb death loss, pre-weaning, percent	9
Lamb death loss, post-weaning, percent	0

**Table 3. Feed and labor estimates for 2020: Early lambing, sell at weaning**

	Units	Units per head, adults	Units per head, lambs	Total units per ewe	Weighted price (dollars per unit)	Total dollars per ewe
Pasture	acres	0.350		0.36	45.00	16.38
Hay	pounds	403.7		420	0.061	25.48
Supplement	pounds	25.7	1.2	28.6	0.118	3.39
Mineral	pounds	7.8		8.1	0.45	3.64
Labor	hours	3.8		3.95	15.00	59.28

**Table 4. Land and capital investment estimates for 2020: Early lambing, sell at weaning**

	Units	Quantity	Dollars per unit	Enterprise total dollars	Dollars per ewe
Pastureland	acres	36	2,200	80,080	801
Breeding stock unit	ewes	100	228	22,840	228
Buildings and facilities				21,000	210
Machinery, equipment, and pickup				13,000	130
Total				136,920	1,369

Note: Building and machinery investment is allocated across multiple enterprises.

This ewe flock budget shows economic cost and return estimates for a production system birthing lambs in the winter. Lambs are sold at weaning for the early spring holiday market. This common management system takes advantage of expected seasonally high prices for lightweight lambs and has a low land requirement. However, it also has relatively high production risk due to breeding challenges and winter lambing, in addition to higher winter feeding costs. Users may customize this budget for their own purposes using the macro-enabled spreadsheet available at <https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/EweEarlyLambingBudget.xlsx>.

# Late Lambing With Graze Out Planning Budget

**Table 1. Missouri sheep flock planning budget for 2020: Late lambing with graze out.**

	Head per ewe	Quantity	Unit	Dollars per unit	Dollars per ewe	Your estimate
<b>Returns per ewe, per year</b>						
Lambs	1.57	107.5	pounds	1.43	241.47	
Culled ewes	0.17	170	pounds	0.55	15.90	
Wool	1.04	8	pounds	0.50	4.16	
Total Returns					<b>261.53</b>	
<b>Operating costs per ewe</b>						
Ewe replacement	0.20		head	200.00	40.00	
Ram net cost and breeding supplies	0.04		head	579.00	7.72	
Pasture		0.69	acres	45.00	30.96	
Hay		342	pounds	0.040	13.82	
Supplement		40	pounds	0.134	5.33	
Mineral		11.0	pounds	0.450	4.93	
Animal health					10.64	
Guard dog replacement and food					10.67	
Bedding and stock supplies					3.88	
Marketing					14.24	
Shearing and other custom hire					5.46	
Machinery fuel, lube, repair					14.67	
Facility maintenance					3.60	
Operating interest		5.5	percent		4.31	
Operator and hired labor		4.25	hour	15.00	63.81	
Total operating costs					<b>234.05</b>	
<b>Ownership costs per ewe</b>						
Business overhead (professional fees, utilities, miscellaneous)					2.25	
Property taxes and insurance					3.22	
Economic depreciation, facility and equipment					17.08	
Interest on annualized capital investment		5.5	percent		23.96	
Total ownership costs					46.51	
<b>Total costs per ewe</b>					<b>280.55</b>	
<b>Return over operating costs, per ewe</b>					27.48	
<b>Return over total costs, per ewe</b>					-19.03	
					Return to labor and management, per ewe	44.78
					Shut-down lamb price, all else equal, \$ per pound	1.27
					Break-even lamb price, all else equal, \$ per pound	1.55

Written by  
**Brent Carpenter**, Field Specialist, Agricultural Business

**Table 2. Production rates for 2020: Late lambing with graze out.**

Rates	Quantity
Lambings, per ewe per year	1
Ewe numbers, start of breeding season	100
Rams for breeding	4
Lamb crop (live birth per exposed), percent	170
Lamb crop (raised to sale weight), percent	157
Adult death loss, percent	3
Lamb death loss, pre-weaning, percent	6
Lamb death loss, post-weaning, percent	2

**Table 3. Feed and labor estimates for 2020: Late lambing with graze out.**

	Units	Units per head, adults	Units per head, lambs	Total units per ewe	Weighted price (dollars per unit)	Total dollars per ewe
Pasture	acres	0.350	0.2	0.69	45.00	30.96
Hay	pounds	328.5		342	0.040	13.82
Supplement	pounds	30.9	4.9	39.9	0.134	5.33
Mineral	pounds	7.8	2.0	11.0	0.45	4.93
Labor	hours	3.6	0.30	4.25	15.00	63.81

**Table 4. Land and capital investment estimates for 2020: Late lambing with graze out.**

	Units	Quantity	Dollars per unit	Enterprise total dollars	Dollars per ewe
Pastureland	acres	69	2,200	151,382	1,514
Breeding stock unit	ewes	100	228	22,840	228
Buildings and facilities				21,000	210
Machinery, equipment, and pickup				13,000	130
Total				208,222	2,082

Note: Building and machinery investment is allocated across multiple enterprises.

This ewe flock budget shows cost and return estimates for a forage based production system birthing lambs in the spring. Feeder lambs are retained and raised on pasture until early winter, targeting holiday markets. While late lambing misses expected seasonally high prices for lightweight lambs in the spring, the livestock production cycle more closely aligns with the natural breeding season and forage production, resulting in relatively lower production risk and winter feeding costs. Users may customize this budget for their own purposes using the macro-enabled spreadsheet available at <https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/EweLateLambingBudget.xlsx>.

# Corn (Dryland) Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of corn for grain. Table 1 presents estimates for the 2020 crop year for dryland corn production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri corn (dryland) planning budget for 2020.**

	Dollars per acre	Your estimate
<b>Income per acre</b>		
Grain sales	635.25	
Other income	0.00	
<b>Total income per acre</b>	<b>635.25</b>	
<b>Operating costs per acre</b>		
Seed	93.75	
Fertilizer and soil amendments	107.63	
Crop protection chemicals	40.00	
Crop supplies, storage, and marketing	1.50	
Crop consulting and insurance	23.00	
Custom hire and rental	6.75	
Machinery fuel, drying, and irrigation energy	38.49	
Machinery repairs and maintenance	17.68	
Operator and hired labor	15.88	
Operating interest	9.48	
<b>Total operating costs per acre</b>	<b>354.17</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	3.60	
Machinery overhead	26.82	
Machinery depreciation	31.97	
Real estate charge	150.50	
<b>Total ownership costs per acre</b>	<b>212.89</b>	
<b>Total costs per acre</b>	<b>567.05</b>	
<b>Income over operating costs per acre</b>		
	<b>281.08</b>	
<b>Income over total costs per acre</b>		
	<b>68.20</b>	
Operating costs per bushel	2.15	
Ownership costs per bushel	1.29	
<b>Total costs per bushel</b>	<b>3.44</b>	

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the dryland corn budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in corn (dryland) planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	165	Corn market price, per bushel	3.85
Seeding rate, count	30,000	Seed, per 80,000 seed bag	250.00
Nitrogen rate, pounds	165	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	74	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	48	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.60	Lime, per ton	20.00
Sum of allocated labor, hours	0.97	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in corn (dryland) planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
V-ripper 30-inch (17 feet); 360 4WD	0.03	0.45	2.25	5.72	7.97	0.3
Row crop planter (16 row); 225 MFWD	0.05	0.53	5.61	10.85	16.46	1.0
Boom sprayer (90 feet); 160 MFWD	0.04	0.31	3.06	4.59	7.65	2.0
Anhydrous applicator (21 feet); 225 MFWD	0.09	0.88	5.73	7.23	12.96	1.0
Combine, corn head (8 row); 275 HP	0.15	1.78	15.53	19.15	35.68	1.0
Grain cart (500 bushel); 225 MFWD	0.07	0.73	4.32	5.51	9.84	
Grain auger (5,000 bushels per hour); 130 MFWD	0.03	0.19	1.30	1.16	2.46	
Semi, tractor and trailer		0.58	3.31	2.44	5.74	
Pickup truck		0.33	1.45	2.13	3.58	
<b>Total<sup>3</sup></b>	<b>0.47</b>	<b>5.79</b>	<b>43.56</b>	<b>58.79</b>	<b>102.35</b>	<b>5.3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 4WD = 4-wheel drive tractor; MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing corn and other grain crops in Missouri.

# Corn (Irrigated) Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of irrigated corn. Table 1 presents estimates for the 2020 crop year for irrigated corn production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri corn (irrigated) planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grain sales	789.25	
Other income	0.00	
<b>Total income per acre</b>	<b>789.25</b>	
<b>Operating costs per acre</b>		
Seed	100.00	
Fertilizer and soil amendments	130.64	
Crop protection chemicals	40.00	
Crop supplies, storage, and marketing	2.00	
Crop consulting and insurance	23.00	
Custom hire and rental	6.75	
Machinery fuel, drying, and irrigation energy	81.54	
Machinery repairs and maintenance	51.67	
Operator and hired labor	23.82	
Operating interest	12.63	
<b>Total operating costs per acre</b>	<b>472.06</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	3.00	
Machinery overhead	47.86	
Machinery depreciation	57.46	
Real estate charge	189.00	
<b>Total ownership costs per acre</b>	<b>297.31</b>	
<b>Total costs per acre</b>	<b>769.38</b>	
<b>Income over operating costs per acre</b>		
	<b>317.19</b>	
<b>Income over total costs per acre</b>		
	<b>19.87</b>	
Operating costs per bushel	2.30	
Ownership costs per bushel	1.45	
<b>Total costs per bushel</b>	<b>3.75</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy



Table 2 shows input assumptions used to estimate the irrigated corn budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in corn (irrigated) planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	205	Corn market price, per bushel	3.85
Seeding rate, count	32,000	Seed, per 80,000 seed bag	250.00
Nitrogen rate, pounds N	205	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	92	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	59	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.6	Lime, per ton	20.00
Sum of allocated labor, hours	1.52	Skilled labor, per hour	20.00
Irrigation, inches	6	Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in corn (irrigated) planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Field cultivator (35 ft); 130 MFWD	0.04	0.23	2.09	2.73	4.82	1
V-ripper 30" (17 feet); 225 MFWD	0.03	0.28	1.74	4.27	6.01	0.3
Split row no-till planter; 225 MFWD	0.05	0.53	5.05	12.02	17.06	1
Boom sprayer (90 feet); 130 MFWD	0.04	0.25	2.81	4.49	7.30	2
Anhydrous applicator (21 feet); 225 MFWD	0.09	0.88	5.73	7.23	12.96	1
Combine, corn head (8 row); 275 HP	0.15	1.78	16.53	19.15	35.68	1
Grain cart (500 bushel); 225 MFWD	0.07	0.73	4.32	5.51	9.84	
Grain auger (5,000 bushels per hour); 130 MFWD	0.04	0.23	1.62	1.44	3.06	
Irrigation	0.50		59.39	44.00	103.39	1
Semi, tractor and trailer		0.90	4.37	2.70	7.07	
Pickup truck		0.28	1.21	1.77	2.98	
<b>Total<sup>3</sup></b>	<b>1.02</b>	<b>6.09</b>	<b>104.85</b>	<b>105.31</b>	<b>210.17</b>	<b>7.3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing corn and other grain crops in Missouri.

# Corn Silage Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of corn silage. Table 1 presents estimates for the 2020 crop year for corn silage production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri corn silage planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Silage sales	675.00	
Other income	0.00	
<b>Total income per acre</b>	<b>675.00</b>	
<b>Operating costs per acre</b>		
Seed	84.56	
Fertilizer and soil amendments	150.75	
Crop protection chemicals	40.00	
Crop supplies, storage, and marketing	6.00	
Custom hire and rental	83.25	
Machinery fuel and irrigation energy	18.00	
Machinery repairs and maintenance	19.69	
Operator and hired labor	22.11	
Operating interest	11.67	
<b>Total operating costs per acre</b>	<b>436.03</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	8.00	
Machinery overhead	20.19	
Machinery depreciation	32.78	
Real estate charge	150.50	
<b>Total ownership costs per acre</b>	<b>211.47</b>	
<b>Total costs per acre</b>	<b>647.50</b>	
<b>Income over operating costs per acre</b>		
	<b>238.97</b>	
<b>Income over total costs per acre</b>		
	<b>27.50</b>	
Operating costs per ton, as-is basis	24.22	
Ownership costs per ton, as-is basis	11.75	
<b>Total costs per ton, as-is basis</b>	<b>35.97</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the corn silage budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in corn silage planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Forage yield, tons, as-is basis	18	Corn silage market price, per ton	37.50
Seeding rate, corn	33,000	Seed, per 80,000 seed bag	205.00
Nitrogen rate, pounds	140	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	70	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	165	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	1.51	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in corn silage planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Field cultivator (18 ft); 160 MFWD	0.08	0.54	3.97	3.86	7.83	1
Row crop planter (12 row); 130 MFWD	0.07	0.41	4.34	7.14	11.48	1
Boom sprayer (90 ft); 105 2WD	0.04	0.21	2.48	3.35	5.83	2
Anhydrous applicator (21 feet); 160 MFWD	0.09	0.63	4.67	4.20	8.87	1
Silage chopper, 3 row (7.5 feet); 160 MFWD	0.48	3.40	33.44	29.14	62.58	1
Pickup truck		0.83	3.64	5.29	8.93	
<b>Total<sup>3</sup></b>	<b>0.76</b>	<b>6.02</b>	<b>52.54</b>	<b>52.97</b>	<b>105.52</b>	<b>6</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor; MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing corn silage and other forage crops in Missouri.

# Soybean (Dryland) Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of soybeans for grain. Table 1 presents estimates for the 2020 crop year for dryland soybean production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri soybean (dryland) planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grain sales	450.00	
Other income	0.00	
<b>Total income per acre</b>	<b>450.00</b>	
<b>Operating costs per acre</b>		
Seed	58.93	
Fertilizer and soil amendments	49.43	
Crop protection chemicals	48.00	
Crop supplies, storage, and marketing	2.00	
Crop consulting and insurance	12.00	
Custom hire and rental	6.75	
Machinery fuel, drying, and irrigation energy	11.12	
Machinery repairs and maintenance	11.63	
Operator and hired labor	12.89	
Operating interest	5.85	
<b>Total operating costs per acre</b>	<b>218.61</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	3.60	
Machinery overhead	17.86	
Machinery depreciation	21.31	
Real estate charge	150.50	
<b>Total ownership costs per acre</b>	<b>193.27</b>	
<b>Total costs per acre</b>	<b>411.87</b>	
<b>Income over operating costs per acre</b>		
	<b>231.39</b>	
<b>Income over total costs per acre</b>		
	<b>38.13</b>	
Operating costs per bushel	4.37	
Ownership costs per bushel	3.87	
<b>Total costs per bushel</b>	<b>8.24</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the dryland soybean budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in soybean (dryland) planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	50	Soybean market price, per bushel	9.00
Seeding rate, count	170,000	Seed, per 150,000 seed bag	52.00
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	42	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	73	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	0.79	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in soybean (dryland) planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Tandem disk (30 feet); 360 4WD	0.06	0.91	5.12	7.56	12.69	1
Row crop planter (16 row); 225 MFWD	0.05	0.53	5.61	10.85	16.46	1
Boom sprayer (90 feet); 130 MFWD	0.04	0.25	2.81	4.49	7.30	2
Combine, flexible grain head (30 feet); 275 HP	0.07	0.91	8.10	9.07	17.17	1
Grain cart (500 bushel); 225 MFWD	0.05	0.46	2.79	3.50	6.29	
Grain auger (5,000 bushels per hour); 130 MFWD	0.01	0.06	0.40	0.35	0.76	
Semi, tractor and trailer		0.29	1.65	1.21	2.87	
Pickup truck		0.33	1.45	2.13	3.59	
<b>Total<sup>3</sup></b>	<b>0.29</b>	<b>3.73</b>	<b>27.94</b>	<b>39.17</b>	<b>67.11</b>	<b>5</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 4WD = 4-wheel drive tractor; MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing soybeans and other grain crops in Missouri.

# Soybean (Double Crop) Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of double crop soybeans for grain, after wheat. Table 1 presents estimates for the 2020 crop year for double crop soybean production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri soybean (double crop) planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grain sales	270.00	
Other income	0.00	
<b>Total income per acre</b>	<b>270.00</b>	
<b>Operating costs per acre</b>		
Seed	69.33	
Fertilizer and soil amendments	23.33	
Crop protection chemicals	9.00	
Crop supplies, storage, and marketing	0.00 <sup>2</sup>	
Crop consulting and insurance	0.00	
Custom hire and rental	0.00 <sup>2</sup>	
Machinery fuel, drying, and irrigation energy	7.43	
Machinery repairs and maintenance	9.62	
Operator and hired labor	10.34	
Operating interest	3.55	
<b>Total operating costs per acre</b>	<b>132.60</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	4.50	
Machinery overhead	13.96	
Machinery depreciation	13.99	
Real estate charge	0.00 <sup>2</sup>	
<b>Total ownership costs per acre</b>	<b>32.45</b>	
<b>Total costs per acre</b>	<b>165.05</b>	
<b>Income over operating costs per acre</b>	<b>137.40</b>	
<b>Income over total costs per acre</b>	<b>104.95</b>	
	Operating costs per bushel	4.42
	Ownership costs per bushel	1.08
	<b>Total costs per bushel</b>	<b>5.50</b>

<sup>1</sup> Totals may not sum due to rounding.

<sup>2</sup> These expenses were charged to wheat production since soybeans were planted in the same year wheat was harvested.

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**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the double crop soybean budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge was not included but could be allocated between the soybean and wheat crops.

**Table 2. Input assumptions used in soybean (double crop) planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	30	Soybean market price, per bushel	9.00
Seeding rate, count	200,000	Seed, per 150,000 seed bag	52.00
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	43	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	43	Potassium, per pound K <sub>2</sub> O	0.31
Sum of allocated labor, hours	0.66	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in soybean (double crop) planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Row crop planter (16 row); 225 MFWD	0.05	0.53	5.61	10.85	16.46	1
Boom sprayer (90 feet); 130 MFWD	0.02	0.12	1.40	2.86	4.26	1
Combine, flexible grain head (30 feet); 275 HP	0.07	0.91	8.10	9.07	17.17	1
Grain auger (5,000 bushels per hour); 130 MFWD	0.01	0.10	0.45	0.50	0.96	
Semi, tractor and trailer		0.49	2.76	2.01	4.77	
Pickup truck		0.42	1.82	2.65	4.46	
<b>Total<sup>3</sup></b>	<b>0.16</b>	<b>2.56</b>	<b>20.14</b>	<b>27.95</b>	<b>48.09</b>	<b>3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 4WD = 4-wheel drive tractor; MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing soybeans and other grain crops in Missouri.

# Winter Wheat Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of winter wheat for grain. Table 1 presents estimates for the 2020 crop year for winter wheat production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri winter wheat planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grain sales	300.00	
Other income	0.00	
<b>Total income per acre</b>	<b>300.00</b>	
<b>Operating costs per acre</b>		
Seed	30.00	
Fertilizer and soil amendments	65.62	
Crop protection chemicals	16.75	
Crop supplies, storage, and marketing	2.00	
Crop consulting and insurance	14.00	
Custom hire and rental	13.50	
Machinery fuel, drying, and irrigation energy	10.69	
Machinery repairs and maintenance	10.43	
Operator and hired labor	12.39	
Operating interest	4.82	
<b>Total operating costs per acre</b>	<b>180.21</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	4.50	
Machinery overhead	14.54	
Machinery depreciation	20.66	
Real estate charge	122.50	
<b>Total ownership costs per acre</b>	<b>162.20</b>	
<b>Total costs per acre</b>	<b>342.41</b>	
<b>Income over operating costs per acre</b>		
	<b>119.79</b>	
<b>Income over total costs per acre</b>		
	<b>-42.41</b>	
	Operating costs per bushel	3.00
	Ownership costs per bushel	2.70
	<b>Total costs per bushel</b>	<b>5.71</b>

<sup>1</sup> Totals may not sum due to rounding.

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Table 2 shows input assumptions used to estimate the winter wheat budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in winter wheat planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	60	Wheat market price, per bushel	5.00
Seeding rate, 50 pound bag	100	Seed, per bag	15.00
Nitrogen rate, pounds N	81	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	36	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	18	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	0.77	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in winter wheat planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
No-till drill (20 feet); 225 MFWD	0.12	1.17	8.97	14.89	23.87	1
Boom sprayer (90 feet); 130 MFWD	0.02	0.12	1.40	2.86	4.26	1
Combine, fixed grain head (30 feet); 275 HP	0.07	0.91	8.09	8.86	16.96	1
Grain cart (500 bushel); 225 MFWD	0.05	0.46	2.75	3.50	6.25	
Grain auger (5,000 bushels per hour); 130 MFWD	0.01	0.07	0.47	0.42	0.90	
Semi, tractor and trailer		0.49	2.76	2.01	4.77	
Pickup truck		0.42	1.82	2.65	4.46	
<b>Total<sup>3</sup></b>	<b>0.27</b>	<b>3.63</b>	<b>26.26</b>	<b>35.20</b>	<b>61.47</b>	<b>3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing winter wheat and other grain crops in Missouri.

# Grain Sorghum Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of grain sorghum. Table 1 presents estimates for the 2020 crop year for grain sorghum production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri grain sorghum planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grain sales	339.50	
Other income	0.00	
<b>Total income per acre</b>	<b>339.50</b>	
<b>Operating costs per acre</b>		
Seed	12.00	
Fertilizer and soil amendments	78.96	
Crop protection chemicals	29.00	
Crop supplies, storage, and marketing	2.00	
Crop consulting and insurance	15.00	
Custom hire and rental	6.75	
Machinery fuel, drying, and irrigation energy	12.24	
Machinery repairs and maintenance	11.80	
Operator and hired labor	13.71	
Operating interest	4.99	
<b>Total operating costs per acre</b>	<b>186.45</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	3.00	
Machinery overhead	21.01	
Machinery depreciation	22.74	
Real estate charge	122.50	
<b>Total ownership costs per acre</b>	<b>169.25</b>	
<b>Total costs per acre</b>	<b>355.70</b>	
<b>Income over operating costs per acre</b>		
	<b>153.05</b>	
<b>Income over total costs per acre</b>		
	<b>-16.20</b>	
Operating costs per bushel	1.92	
Ownership costs per bushel	1.74	
<b>Total costs per bushel</b>	<b>3.67</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
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Table 2 shows input assumptions used to estimate the grain sorghum budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in grain sorghum planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, bushels	97	Grain sorghum market price, per bushel	3.50
Seeding rate, count	90,000	Seed, per 750,000 seed bag	100.00
Nitrogen rate, pounds N	97	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	44	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	28	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	0.85	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in grain sorghum planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
V-ripper 30-inch (17 feet); 360 4WD	0.03	0.45	2.25	5.72	7.97	0.3
Row crop planter (16 row); 225 MFWD	0.05	0.53	5.61	10.85	16.46	1
Boom sprayer (90 feet); 130 MFWD	0.04	0.25	2.81	4.49	7.30	2
Anhydrous applicator (21 feet); 225 MFWD	0.09	0.88	5.73	7.23	12.96	1
Combine, fixed grain head (30 feet); 275 HP	0.07	0.91	8.09	8.86	16.96	1
Grain cart (500 bushel); 225 MFWD	0.04	0.37	2.20	2.80	5.00	
Grain auger (5,000 bushels per hour); 130 MFWD	0.02	0.11	0.76	0.68	1.45	
Semi, tractor and trailer		0.32	1.84	1.34	3.18	
Pickup truck		0.28	1.21	1.76	2.98	
<b>Total<sup>3</sup></b>	<b>0.35</b>	<b>4.10</b>	<b>30.50</b>	<b>43.75</b>	<b>74.25</b>	<b>5.3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 4WD = 4-wheel drive tractor; MFWD = modified front-wheel drive tractor; HP = horsepower

Farmers can also develop their own custom budget by using the Missouri Crop Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/CropBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing grain sorghum and other grain crops in Missouri.

# Alfalfa Establishment Planning Budget

This budget presents information useful to farmers planning the financing, establishment and marketing of alfalfa. Table 1 presents estimates for the 2020 crop year for alfalfa establishment in the fall for northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances. For example, spring established alfalfa would have a higher crop protection cost to account for necessary herbicides.

**Table 1. Missouri alfalfa establishment planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Hay sales (60 pound bales)	420.00	
Other income	0.00	
<b>Total income per acre</b>	<b>420.00</b>	
<b>Operating costs per acre</b>		
Seed	46.50	
Fertilizer and soil amendments	115.90	
Crop protection chemicals	20.00	
Crop supplies, storage, and marketing	8.00	
Custom hire and rental	77.50	
Machinery fuel and irrigation energy	21.40	
Machinery repairs and maintenance	22.13	
Operator and hired labor	41.01	
Operating interest	9.69	
<b>Total operating costs per acre</b>	<b>362.13</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	4.38	
Machinery overhead	20.10	
Machinery depreciation	38.80	
Real estate charge	87.50	
<b>Total ownership costs per acre</b>	<b>150.78</b>	
<b>Total costs per acre</b>	<b>512.91</b>	
<b>Income over operating costs per acre</b>	<b>57.87</b>	
<b>Income over total costs per acre</b>	<b>-92.91</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
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Table 2 shows input assumptions used to estimate the alfalfa establishment budget for small bale production. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in alfalfa establishment planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Forage yield, 60 pound bales	70	Alfalfa market price, per bale	6.00
Seeding rate, pounds	15	Alfalfa seed, per pound	3.10
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	70	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	90	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	3	Lime, per ton	20.00
Sum of allocated labor, hours	2.46	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in alfalfa establishment planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Chisel plow (15 feet); 130 MFWD	0.12	0.67	5.22	5.88	11.10	1
Tandem disk (21 feet); 130 MFWD	0.16	0.94	8.24	7.89	16.13	2
Roller harrow (12 feet); 105 2WD	0.13	0.65	5.12	5.49	10.61	1
No-till drill (15 feet); 130 MFWD	0.16	0.90	9.81	13.72	23.53	1
Disk mower-conditioner (9 feet); 105 2WD	0.35	1.71	15.36	10.82	26.19	2
Wheel rake (2-16'); 60 2WD	0.08	0.20	2.54	3.75	6.29	2
Small square baler; 75 2WD	0.46	1.51	21.47	8.04	29.52	2
Pickup truck		0.52	2.27	3.31	5.58	
<b>Total<sup>3</sup></b>	<b>1.46</b>	<b>7.10</b>	<b>70.04</b>	<b>58.90</b>	<b>128.94</b>	<b>11</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor; MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing alfalfa and other forage crops in Missouri.

# Alfalfa Baleage Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of alfalfa baleage. Establishment costs for alfalfa can be found in MU Extension publication, G661, *Alfalfa Establishment Planning Budget*. Table 1 presents estimates for the 2020 crop year for established alfalfa baleage production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri alfalfa baleage planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Baleage sales	900.00	
Other income	0.00	
<b>Total income per acre</b>	<b>900.00</b>	
<b>Operating costs per acre</b>		
Seed	0.00	
Fertilizer and soil amendments	110.00	
Crop protection chemicals	35.80	
Crop supplies, storage, and marketing	65.00	
Custom hire and rental	72.00	
Machinery fuel and irrigation energy	45.99	
Machinery repairs and maintenance	53.60	
Operator and hired labor	68.91	
Operating interest	12.41	
<b>Total operating costs per acre</b>	<b>463.71</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	8.75	
Machinery overhead	28.76	
Machinery depreciation	70.23	
Real estate charge	87.50	
<b>Total ownership costs per acre</b>	<b>195.24</b>	
<b>Total costs per acre</b>	<b>658.95</b>	
<b>Income over operating costs per acre</b>		
	<b>436.29</b>	
<b>Income over total costs per acre</b>		
	<b>241.05</b>	
Operating costs per ton, as fed	51.52	
Ownership costs per ton, as fed	21.69	
<b>Total costs per ton, as fed</b>	<b>73.21</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the alfalfa baleage budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in alfalfa baleage planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Yield, tons, as fed	9	Market price, per ton	100.00
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	70	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	200	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	1	Lime, per ton	20.00
Sum of allocated labor, hours	4.08	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in alfalfa baleage planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Boom sprayer (90 feet); 105 2WD	0.02	0.11	1.24	2.20	3.43	1
Disk mower-conditioner (9 feet); 105 2WD	0.88	4.27	38.41	21.86	60.27	5
Wheel rake (2-16'); 75 2WD	0.19	0.63	6.89	8.38	15.28	5
Round baler, silage kit (1500 pound); 105 2WD	0.88	4.27	44.86	33.87	78.73	5
Round bale wrapper haylage; 75 2WD	1.50	4.95	63.85	26.07	89.92	
Pickup truck		1.04	4.55	6.62	11.16	
<b>Total<sup>3</sup></b>	<b>3.48</b>	<b>15.26</b>	<b>159.80</b>	<b>98.99</b>	<b>258.79</b>	<b>17</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing alfalfa baleage and other forage crops in Missouri.

# Alfalfa Small Bales Planning Budget

This budget presents information useful to farmers planning the production, financing and marketing of alfalfa small bales. Establishment costs for alfalfa can be found in MU Extension publication, G661, *Alfalfa Establishment Planning Budget*. Table 1 presents estimates for the 2020 crop year for established alfalfa small bale production in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances. For example, an alfalfa large round bale planning budget could be developed by modifying machinery activities and hay sales.

**Table 1. Missouri alfalfa small bales planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Hay sales (60 pound bales)	1,000.02	
Other income	0.00	
<b>Total income per acre</b>	<b>1,000.02</b>	
<b>Operating costs per acre</b>		
Seed	0.00	
Fertilizer and soil amendments	110.00	
Crop protection chemicals	35.80	
Crop supplies, storage, and marketing	15.00	
Custom hire and rental	186.00	
Machinery fuel and irrigation energy	29.14	
Machinery repairs and maintenance	28.16	
Operator and hired labor	49.17	
Operating interest	12.47	
<b>Total operating costs per acre</b>	<b>465.74</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	13.13	
Machinery overhead	12.04	
Machinery depreciation	48.36	
Real estate charge	87.50	
<b>Total ownership costs per acre</b>	<b>161.02</b>	
<b>Total costs per acre</b>	<b>626.76</b>	
<b>Income over operating costs per acre</b>	<b>534.28</b>	
<b>Income over total costs per acre</b>	<b>373.26</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy



Table 2 shows input assumptions used to estimate the alfalfa small bales budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in alfalfa small bales planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Forage yield, 60 pound bales	167	Alfalfa market price, per bale	6.00
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	70	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	200	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	1	Lime, per ton	20.00
Sum of allocated labor, hours	2.70	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in alfalfa small bales planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Swather mower-conditioner (9 feet); 105 MFWD	0.92	4.24	39.19	27.36	66.54	4
Hay tedder (8.5 feet); 60 2WD	0.21	0.55	5.19	2.45	7.64	2
Wheel rake (2-16'); 60 2WD	0.15	0.40	5.08	6.59	11.67	4
Small square baler; 75 2WD	0.92	3.03	42.95	14.07	57.01	4
Pickup truck		1.56	6.82	9.94	16.75	
<b>Total<sup>3</sup></b>	<b>2.20</b>	<b>9.78</b>	<b>99.22</b>	<b>60.40</b>	<b>159.62</b>	<b>14</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor; MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing alfalfa and other forage crops in Missouri.

# Cool Season Pasture Establishment Planning Budget

This budget presents information useful to farmers planning the financing, establishment and grazing of cool season pasture. Table 1 presents estimates for the 2020 crop year for cool season pasture establishment in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri cool season pasture establishment planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Grazing	30.00	
Other income	0.00	
<b>Total income per acre</b>	<b>30.00</b>	
<b>Operating costs per acre</b>		
Seed, orchardgrass and red clover	37.30	
Fertilizer and soil amendments	101.15	
Crop protection chemicals	10.00	
Crop supplies, storage, and marketing	4.00	
Custom hire and rental	26.50	
Machinery fuel and irrigation energy	6.11	
Machinery repairs and maintenance	3.19	
Operator and hired labor	12.05	
Operating interest	5.51	
<b>Total operating costs per acre</b>	<b>205.82</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	5.00	
Machinery overhead	5.58	
Machinery depreciation	8.71	
Real estate charge	39.90	
<b>Total ownership costs per acre</b>	<b>59.19</b>	
<b>Total costs per acre</b>	<b>265.01</b>	
<b>Income over operating costs per acre</b>	<b>-175.82</b>	
<b>Income over total costs per acre</b>	<b>-235.01</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the cool season pasture establishment budget. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in cool season pasture establishment planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Pasture yield, animal unit month	2	Pasture price, per animal unit month	15.00
Seeding rate, pounds orchardgrass	6	Orchardgrass seed, per pound	2.75
Seeding rate, pounds clover	8	Clover seed, per pound	2.60
Nitrogen rate, pounds N	30	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	35	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	45	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	3	Lime, per ton	20.00
Sum of allocated labor, hours	0.77	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in cool season pasture establishment planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Rent, no-till drill (15 feet); 130 MFWD	0.16	0.90	18.85	3.93	22.78	1
Rotary mower (12 feet); 130 MFWD	0.11	0.66	4.98	7.05	12.04	1
Pickup truck		0.52	2.27	3.31	5.58	
<b>Total<sup>3</sup></b>	<b>0.27</b>	<b>2.07</b>	<b>26.11</b>	<b>14.29</b>	<b>40.40</b>	<b>2</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing cool season pasture and other forage crops in Missouri.

# Fescue - Clover Hay Planning Budget

This budget presents information useful to farmers planning the production, financing, grazing and marketing of fescue-clover hay. Table 1 presents estimates for the 2020 crop year for established fescue-clover hay in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri fescue-clover hay planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Hay	360.00	
Grazing	15.00	
Other income	0.00	
<b>Total income per acre</b>	<b>375.00</b>	
<b>Operating costs per acre</b>		
Seed	0.00	
Fertilizer and soil amendments	64.60	
Crop protection chemicals	0.00	
Crop supplies, storage, and marketing	11.00	
Custom hire and rental	24.75	
Machinery fuel and irrigation energy	6.67	
Machinery repairs and maintenance	7.30	
Operator and hired labor	9.82	
Operating interest	3.41	
<b>Total operating costs per acre</b>	<b>127.56</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	5.00	
Machinery overhead	6.96	
Machinery depreciation	10.26	
Real estate charge	47.50	
<b>Total ownership costs per acre</b>	<b>69.72</b>	
<b>Total costs per acre</b>	<b>197.27</b>	
<b>Income over operating costs per acre</b>	<b>247.44</b>	
<b>Income over total costs per acre</b>	<b>177.73</b>	

<sup>1</sup> Totals may not sum due to rounding.

Table 2 shows input assumptions used to estimate the fescue-clover hay budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in fescue-clover hay planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Hay yield, tons, 10% moisture	3	Hay price, per ton	120.00
Pasture yield, animal unit month	1	Pasture price, per animal unit month	15.00
Nitrogen rate, pounds N	40	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	46	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	60	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	0.57	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in fescue-clover hay planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Disk mower-conditioner (9 feet); 130 MFWD	0.18	1.01	8.23	7.37	15.60	1
Wheel rake (2-16'); 75 2WD	0.04	0.13	1.38	2.44	3.82	1
Round baler, net wrap (1500 pound); 130 MFWD	0.11	0.61	8.28	4.11	12.39	1
Pickup truck		0.52	2.27	3.31	5.58	
<b>Total<sup>3</sup></b>	<b>0.32</b>	<b>2.26</b>	<b>20.17</b>	<b>17.22</b>	<b>37.38</b>	<b>3</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor; MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for growing fescue-clover hay and other forage crops in Missouri.

# Fescue Seed and Forage Planning Budget

This budget presents information useful to farmers planning the production, financing, grazing and marketing of fescue. Table 1 presents estimates for the 2020 crop year for established fescue used for seed, hay and grazing purposes in northern, central and southwest Missouri. Assumptions were based on price conditions as of October 2019. Detailed prices and practices are summarized in Tables 2 and 3. The production practices used to develop these cost estimates are common in Missouri. Farmers are encouraged to modify this budget based on their circumstances.

**Table 1. Missouri fescue seed and forage planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income per acre</b>		
Fescue hay	224.00	
Fescue seed	90.00	
Grazing	15.00	
Other income	0.00	
<b>Total income per acre</b>	<b>329.00</b>	
<b>Operating costs per acre</b>		
Seed	0.00	
Fertilizer and soil amendments	77.60	
Crop protection chemicals	0.00	
Crop supplies, storage, and marketing	7.00	
Custom hire and rental	38.50	
Machinery fuel and irrigation energy	7.75	
Machinery repairs and maintenance	8.87	
Operator and hired labor	14.60	
Operating interest	4.24	
<b>Total operating costs per acre</b>	<b>158.57</b>	
<b>Ownership costs per acre</b>		
Farm business overhead	3.00	
Machinery overhead	7.45	
Machinery depreciation	11.99	
Real estate charge	47.50	
<b>Total ownership costs per acre</b>	<b>69.93</b>	
<b>Total costs per acre</b>	<b>228.50</b>	
<b>Income over operating costs per acre</b>	<b>170.43</b>	
<b>Income over total costs per acre</b>	<b>100.50</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Raymond Massey**, Extension Professor, Agricultural Business and Policy

Table 2 shows input assumptions used to estimate the fescue seed and forage budget. Price estimates reflect harvest time prices. Costs or returns from storage or other marketing methods are not included. No income from government programs are added. Farm business overhead includes liability insurance, utilities, accounting, etc. Real estate charge is an estimated rental rate for above average land.

**Table 2. Input assumptions used in fescue seed and forage planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Hay yield, tons	4	Hay price, per ton	56.60
Seed yield, pounds	300	Seed price, per pound	0.30
Pasture yield, animal unit month	1	Pasture price, per animal unit month	15.00
Nitrogen rate, pounds N	70	Nitrogen, per pound N	0.44
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	30	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	80	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.5	Lime, per ton	20.00
Sum of allocated labor, hours	0.82	Skilled labor, per hour	20.00
		Farm diesel, per gallon	3.04

Table 3 details the field activities assumed in this budget and their machinery costs. Machinery costs were estimated using an economic engineering approach.

**Table 3. Machinery assumptions used in fescue seed and forage planning budget for 2020, on a per acre basis.**

Machine activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Swather mower-conditioner (9 feet); 105 MFWD	0.23	1.06	9.80	9.51	19.31	1
Wheel rake (2-16'); 60 2WD	0.04	0.10	1.27	2.32	3.59	1
Round baler, net wrap (1500 pound); 105 MFWD	0.11	0.49	7.72	3.06	10.78	1
Combine, fixed grain head (15 feet); 100 horsepower	0.15	0.66	6.87	2.78	9.65	1
Pickup truck		0.28	1.21	1.76	2.98	
<b>Total<sup>3</sup></b>	<b>0.52</b>	<b>2.59</b>	<b>26.87</b>	<b>19.43</b>	<b>46.30</b>	<b>4</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs, maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of machinery overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: 2WD = 2-wheel drive tractor; MFWD = modified front-wheel drive tractor

Farmers can also develop their own custom budget by using the Missouri Forage Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/Forages/Docs/ForageBudgetGenerator.xlsm>). This spreadsheet tool allows users to develop a custom estimate for their costs and returns for fescue and other forage crops in Missouri.

# Industrial Hemp for Grain Planning Budget

This budget presents information useful to farmers considering industrial hemp production for grain. Table 1 presents income and cost estimates for industrial hemp grain production in Missouri. Assumptions were based on price forecasts as of November 2019. Detailed assumptions are summarized in Tables 2 and 3. Production was assumed to be done on 40 acres. Hemp has not been produced in Missouri for decades. Several assumptions used in this budget are from states such as Kentucky, Tennessee, and North Dakota that have recently grown hemp. Farmers should understand that these assumptions may not fit Missouri production. A sensitivity analysis showing the impact on profit of various yields and market prices is included in Table 4.

Because this budget contains much anecdotal, as opposed to research-based information, we suggest that farmers customize the budget by using the Missouri Hemp Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/IndustrialHempBudget.xlsx>).

**Table 1. Missouri industrial hemp for grain planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income</b>		
Hemp grain	720.00	
<b>Total income</b>	<b>720.00</b>	
<b>Operating costs</b>		
Seed	90.00	
Fertilizer	61.20	
Machinery operating cost	28.41	
Custom hire and rental	76.00	
Registration and background check	20.00	
Sampling costs	7.50	
Operating interest	7.79	
<b>Total operating costs</b>	<b>290.90</b>	
<b>Ownership costs</b>		
Machinery ownership	71.89	
Real estate charge	125.00	
<b>Total ownership costs</b>	<b>196.89</b>	
<b>Total costs</b>	<b>487.79</b>	
<b>Income over operating costs</b>	<b>429.10</b>	
<b>Income over total costs</b>	<b>232.21</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Ray Massey**, Extension Professor, Agricultural Business and Policy  
**Chase Morrison**, Student Assistant



## Income considerations

Missouri-specific hemp yield and variety trial information does not currently exist to guide producers. The yields used in this budget are estimates from other states, which also have limited research results and different growing conditions. Modest yields are used in this budget until the agronomic recommendations for Missouri have been better defined. The market for hemp grain is also immature with little price history. The hemp grain prices used in this budget are the authors' best estimate given limited market information.

It is suggested producers secure a contract to sell their hemp grain before producing the crop. Use the contract price to estimate income. Typical contracts may specify the quality of hemp grain delivered. To meet contract specifications and be assured a market and price, farmers need to be confident that they can deliver clean, dry grain. Additional storage, cleaning, or drying equipment, not included in this budget, may be necessary to obtain the contracted price. Delivered grain that fails to meet contract specifications may not be marketable. Because of this emerging industry's dynamics, hemp grain processors may issue contracts that they are unable to honor at harvest time.

Growing hemp includes a legal risk. Production of hemp is legal only if produced in accordance with Missouri law and the plant tests at or below postdecarboxylation 0.3% delta-9-tetrahydrocannabinol (THC). Under proposed regulations, the producer will be responsible for taking composite samples for each variety produced. Samples for varieties testing greater than 0.3% may result in crop destruction. Producers required to destroy varieties testing out of compliance must do so according to the Missouri Department of Agriculture's destruction protocol. Costs for destroying the crop and destruction certification are the responsibility of the producer. Destruction will be verified by the Missouri State Highway Patrol or local law enforcement. No compensation is provided for the destroyed hemp crop.

## Agronomic considerations

The production contracts that farmers sign may specify the seed variety planted; harvesting, storage, and delivery methods used; and expected yields. These contract specifications will affect the agronomic practices used and costs incurred to produce hemp for grain.

Seeding rate for this hemp grain budget was set at 30 pounds per acre. Other states report seeding rates of 20 to 30 pounds per acre. The cost of seed reported by other states varies dramatically. We chose a seed price of \$3 per pound because of the relative scarcity of hemp seed. As seeds become more plentiful, the cost of seed may merge closer to the expected price of the sold hemp grain, \$0.60 per pound in this budget.

Nitrogen (N), phosphorus (P), and potassium (K) fertilization is necessary for hemp production. No Missouri-specific recommendations exist yet. Purdue University states, "Hemp requires about the same fertility requirements as a high-yielding crop of wheat, or corn."

No pesticides are currently labelled for use on hemp. This increases the risk of low yield because hemp is subject to weed, insect, and disease pressure. This budget assumes disking to kill weeds prior to planting. Weed management is currently limited to planting in a clean field, obtaining good emergence and assuming the quick-growing hemp will canopy and suppress weed growth. Any disease or insect problems will reduce yields, and the farmer will have few chemical options to control them.

This budget includes cost estimates for a required background check on the farmer and for registration of production with the Missouri Department of Agriculture. We assumed the farmer would send two samples to a lab to test for THC levels. Regulations require only one test per variety showing THC levels below 0.3 percent. The additional test is necessary if the first test shows the field exceeds legal limits. These

**Table 2. Input assumptions used in Missouri industrial hemp for grain planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Grain yield, pounds	1,200	Grain price, per pound	0.60
Seeding rate, pounds	30	Seed, per pound	3.00
Nitrogen rate, pounds N	100	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	30	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	20	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.6	Lime, per ton	20.00
Fuel for machinery and drying, gallons	5.16	Fuel, per gallon	3.04
Labor, hours	0.64	Labor, per hour	20.00

**Table 3. Machinery used in Missouri industrial hemp for grain planning budget for 2020, on a per acre basis.**

Machinery activity (including custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>1</sup> (dollars)	Total costs (dollars)	Trips across field
Anhydrous application, 200 MFWD	0.08	0.64	3.49	7.30	10.79	1
Tandem disk, fold (21 feet), 160 MFWD	0.16	1.48	7.78	19.92	27.70	2
Presswheel drill (16 feet), 105 MFWD	0.15	0.61	4.81	10.05	14.85	1
Combine flex platform (25 feet), 375 HP	0.13	2.04	8.89	27.29	36.18	1
Rotary mower/conditioner (12 feet), 75 HP	0.11	0.38	3.44	7.35	10.79	1
Dry fertilizer application, custom charge					13.50	2
Grain drying, custom charge					11.00	
Hauling grain to bin, custom charge					2.50	
Hauling grain to market, custom charge					9.00	
Seed cleaning, custom charge					40.00	
<b>Total<sup>2</sup></b>	<b>0.64</b>	<b>5.16</b>	<b>28.41</b>	<b>71.89</b>	<b>176.31</b>	<b>8</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs and maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of overhead and depreciation.

Totals may not sum due to rounding. Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower.

regulatory costs are spread over 40 acres of hemp for grain production.

## Machinery considerations

This budget assumes field operations that budgets from other states have recommended. The farmer is expected to apply nitrogen fertilizer with owned equipment. P and K fertilizers are assumed to be applied by the fertilizer dealer. Preplant weed control is disking twice. If planting does not occur soon after disking, then weeds may emerge, and a subsequent field cultivation may be necessary. The farmer is assumed to own the necessary grain drill to plant the hemp as well as the necessary equipment to harvest the hemp.

Anecdotal evidence indicates that harvesting hemp grain is more difficult than harvesting traditional grain crops. Wrapping and fire danger have been reported. The costs of repair and time to cover a single acre might be greater than estimated in this budget. After harvest, it is expected that the extensive hemp

residue will be mowed and left on the field. Future markets for low-quality hemp fiber may emerge as the industry evolves. This budget also includes custom drying and farm-to-market transportation charges.

## Sensitivity analysis

Uncertainty abounds when new crops are grown. Sensitivity analysis illustrates the impact on income over total costs of varying two critical factors. Yield and market price uncertainty significantly impact income. The gray highlights of Table 4 show the scenario that corresponds to this budget with a 1,200 pound yield per acre and \$0.60 per pound market price.

**Table 4. Sensitivity analysis: income over total costs per acre.**

Market price (dollars per pound)	Grain yield (pounds per acre)				
	800	1,000	1,200	1,400	1,600
0.40	-167.79	-87.79	-7.79	72.21	152.21
0.50	-87.79	12.21	112.21	212.21	312.21
0.60	-7.79	112.21	232.21	352.21	472.21
0.70	72.21	212.21	352.21	492.21	632.21
0.80	152.21	312.21	472.21	632.21	792.21

# Industrial Hemp for Fiber Planning Budget

This budget presents information useful to farmers considering industrial hemp production for fiber. Table 1 presents income and cost estimates for industrial hemp fiber production in Missouri. Assumptions were based on price forecasts as of November 2019. Detailed assumptions are summarized in Tables 2 and 3. Production was assumed to be done on 40 acres. Hemp has not been produced in Missouri for decades. Several assumptions used in this budget are from states such as Kentucky, Tennessee, and North Dakota that have recently grown hemp. Farmers should understand that these assumptions may not fit Missouri production. A sensitivity analysis showing the impact on profit of various yield and market prices is included in Table 4.

Because this budget contains much anecdotal, as opposed to research-based information, we suggest that farmers customize the budget by using the Missouri Hemp Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/IndustrialHempBudget.xlsx>).

**Table 1. Missouri industrial hemp for fiber planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income</b>		
Hemp fiber bales	625.00	
<b>Total income</b>	<b>625.00</b>	
<b>Operating costs</b>		
Seed	150.00	
Fertilizer	59.90	
Machinery operating cost	21.44	
Custom hire and rental	156.00	
Registration and background check	20.00	
Sampling costs	7.50	
Operating interest	11.41	
<b>Total operating costs</b>	<b>426.25</b>	
<b>Ownership costs</b>		
Machinery ownership	47.21	
Real estate charge	125.00	
<b>Total ownership costs</b>	<b>172.21</b>	
<b>Total costs</b>	<b>598.46</b>	
<b>Income over operating costs</b>	<b>198.75</b>	
<b>Income over total costs</b>	<b>26.54</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
**Ray Massey**, Extension Professor, Agricultural Business and Policy  
**Chase Morrison**, Student Assistant

## Income considerations

Missouri-specific hemp yield and variety trial information does not currently exist to guide producers. The yields used in this budget are estimates from other states, which also have limited research results and different growing conditions. Modest yields are used in this budget until the agronomic recommendations for Missouri have been better defined. The market for hemp fiber is also immature with little price history. The hemp fiber prices used in this budget are the authors' best estimates given limited market information.

It is suggested producers secure a contract to sell their hemp fiber before producing the crop. Use the contract price to estimate income. Because of this emerging industry's dynamics, hemp fiber processors may issue contracts that they are unable to honor at harvest time.

Growing hemp includes a legal risk. Production of hemp is legal only if produced in accordance with Missouri law and the plant tests at or below postdecarboxylation 0.3% delta-9-tetrahydrocannabinol (THC). Under proposed regulations, the producer will be responsible for taking composite samples for each variety produced. Samples for varieties testing greater than 0.3% may result in crop destruction. Producers required to destroy varieties testing out of compliance must do so according to the Missouri Department of Agriculture's destruction protocol. Costs for destroying the crop and destruction certification are the responsibility of the producer. Destruction will be verified by the Missouri State Highway Patrol or local law enforcement. No compensation is provided for the destroyed hemp crop.

## Agronomic considerations

The production contracts that farmers sign may specify the seed variety planted; harvesting, storage, and delivery methods used; and expected yields. These contract specifications will affect the agronomic practices and costs of producing hemp for fiber.

Seeding rate for this hemp fiber budget was set at 50 pounds per acre. Other states report seeding rates of 35 to 80 pounds per acre. The cost of seed reported by other states varies dramatically. We chose a seed price of \$3 per pound because of the relative scarcity of hemp seed. Nitrogen (N), phosphorus (P), and potassium (K) fertilization is necessary for hemp production. No Missouri-specific recommendations exist yet. Purdue University states, "Hemp requires about the same fertility requirements as a high-yielding crop of wheat, or corn."

No pesticides are currently labelled for use on hemp. This increases the risk of low yield because hemp is subject to weed, insect, and disease pressure. This budget assumes disking to kill weeds prior to planting. Weed management is currently limited to planting in a clean field, obtaining good emergence and assuming the quick-growing hemp will canopy and suppress weed growth. Any disease or insect problems will reduce yields, and the farmer will have few chemical options to control them.

This budget includes cost estimates for a required background check on the farmer and for registration of production with the Missouri Department of Agriculture. We assumed the farmer would send two samples to a lab to test for THC levels. Regulations require only one test per variety showing THC levels below 0.3 percent. The additional test is necessary if the first test shows the field exceeds legal limits. These regulatory costs are spread over 40 acres of hemp for fiber production.

**Table 2. Input assumptions used in Missouri industrial hemp for fiber planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Fiber yield, tons	5	Fiber price, per ton	125.00
Seeding rate, pounds	50	Seed, per pound	2.00
Nitrogen rate, pounds N	50	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	50	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	40	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.6	Lime, per ton	20.00
Fuel for machinery and drying, gallons	3.22	Fuel, per gallon	3.04
Labor, hours	0.55	Labor, per hour	20.00

## Machinery considerations

This budget assumes field operations that budgets from other states have recommended. The farmer is expected to apply nitrogen fertilizer with owned equipment. P and K fertilizers are assumed to be applied by the fertilizer dealer. Preplant weed control is disking twice. If planting does not occur soon after disking, then weeds may emerge, and a subsequent field cultivation may be necessary. The farmer is assumed to own the necessary grain drill to plant the hemp as well as the necessary equipment to mow and rake the hemp stalks.

Anecdotal evidence indicates that harvesting fiber is more difficult than harvesting traditional forage crops. Wrapping and fire danger have been reported. The costs of repair and time to cover a single acre might be greater than estimated in this budget. If contract specifications

require on-farm storage, then additional tarping or shed costs may be necessary.

This budget also includes a custom charge for baling the fiber into large rectangular bales and transportation of hemp fiber bales to market.

## Sensitivity analysis

Uncertainty abounds when new crops are grown. Sensitivity analysis illustrates the impact on income over total costs of varying two critical factors. Yields and market price uncertainty significantly impact income. The gray highlights of Table 4 show the scenario that corresponds to this budget with a 5 ton yield per acre and \$125 per ton market price.

**Table 3. Machinery used in Missouri industrial hemp for fiber planning budget for 2020, on a per acre basis.**

Machinery activity (including custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>1</sup> (dollars)	Total costs (dollars)	Trips across field
Anhydrous application, 200 MFWD	0.08	0.64	4.61	7.30	10.79	1
Tandem disk, fold (21 feet), 160 MFWD	0.16	1.48	10.78	19.91	27.70	2
Presswheel drill (16 feet), 105 MFWD	0.15	0.61	5.15	10.05	14.85	1
Sickle mower, 75 HP tractor	0.12	0.35	3.95	6.90	10.32	1
Hay rake (30 feet), 40 HP tractor	0.08	0.13	2.24	3.05	4.99	2
Dry fertilizer application, custom charge					13.50	2
Large rectangular bales, custom charge					85.00	1
Moving large rectangular bales, custom charge					57.50	1
<b>Total<sup>2</sup></b>	<b>0.58</b>	<b>3.22</b>	<b>21.44</b>	<b>47.21</b>	<b>224.65</b>	<b>10</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs and maintenance, and the value of labor. Machinery ownership cost is the sum of overhead and depreciation.

<sup>2</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower.

**Table 4. Sensitivity analysis: income over total costs per acre.**

Market price (dollars per ton)	Fiber yield (tons per acre)				
	3	4	5	6	7
75	-\$373.46	-298.46	-223.46	-148.46	-73.46
100	-298.46	-198.46	-98.46	1.54	101.54
125	-223.46	-98.46	26.54	151.54	276.54
150	-148.46	1.54	151.54	301.54	451.54
175	-73.46	101.54	276.54	451.54	626.54

# Industrial Hemp for Grain and Fiber Planning Budget

This budget presents information useful to farmers considering industrial hemp production for grain and fiber. Table 1 presents income and cost estimates for industrial hemp grain and fiber production in Missouri. Assumptions were based on price forecasts as of November 2019. Detailed assumptions are summarized in Tables 2 and 3. Production was assumed to be done on 40 acres. Hemp has not been produced in Missouri for decades. Several assumptions used in this budget are from states such as Kentucky, Tennessee, and North Dakota that have recently grown hemp. Farmers should understand that these assumptions may not fit Missouri production. A sensitivity analysis of this budget is included in Tables 4 and 5. These tables show how various yield and market price scenarios impact profitability.

**Table 1. Missouri industrial hemp for grain and fiber planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income</b>		
Hemp fiber bales	375.00	
Hemp grain	450.00	
<b>Total income</b>	<b>825.00</b>	
<b>Operating costs</b>		
Seed	120.00	
Fertilizer	90.90	
Machinery operating cost	35.32	
Custom hire and rental	143.25	
Registration and background check	20.00	
Sampling costs	7.50	
Operating interest	11.47	
<b>Total operating costs</b>	<b>428.44</b>	
<b>Ownership costs</b>		
Machinery ownership	74.50	
Real estate charge	125.00	
<b>Total ownership costs</b>	<b>199.50</b>	
<b>Total costs</b>	<b>627.94</b>	
<b>Income over operating costs</b>	<b>396.56</b>	
<b>Income over total costs</b>	<b>197.06</b>	

<sup>1</sup> Totals may not sum due to rounding.

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**Chase Morrison**, Student Assistant

Because this budget contains much anecdotal, as opposed to research-based information, we suggest that farmers customize the budget by using the Missouri Hemp Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/IndustrialHempBudget.xlsx>).

## Income considerations

Missouri-specific hemp yield and variety trial information does not currently exist to guide producers. The yields used in this budget are estimates from other states, which also have limited research results and different growing conditions. Modest yields are used in this budget until the agronomic recommendations for Missouri have been better defined. Markets for hemp grain and fiber are also immature and have little price history. The prices used in this budget for hemp grain and fiber are the authors' best estimates given limited market information.

It is suggested producers secure a contract to sell their hemp grain and fiber before producing the crop. Use the contract price to estimate income. Typical contracts may specify the quality of hemp grain delivered. Fiber contracts may specify the process to ret (partially break down) the fiber. To meet the contract specification and be assured a market and price, farmers need to be confident that they can deliver clean, dry grain and quality fiber. Additional storage, cleaning or drying equipment, not included in this budget, may be necessary to obtain the contracted price. Grain delivered outside of contract specifications may be unmarketable. Because of this emerging industry's dynamics, hemp processors may issue contracts which they are unable to honor at harvest time.

Growing hemp includes a legal risk. Production of hemp is legal only if produced in accordance with Missouri law and the plant tests at or below postdecarboxylation 0.3% delta-9-tetrahydrocannabinol

(THC). Under proposed regulations, the producer will be responsible for taking composite samples for each variety produced. Samples for varieties testing greater than 0.3% may result in crop destruction. Producers required to destroy varieties testing out of compliance must do so according to the Missouri Department of Agriculture's destruction protocol. Costs for destroying the crop and destruction certification are the responsibility of the producer. Destruction will be verified by the Missouri State Highway Patrol or local law enforcement. No compensation is provided for the destroyed hemp crop.

## Agronomic considerations

The production contracts that farmers sign may specify the seed variety planted; harvesting, storage, and delivery methods used; and expected yields. These contract specifications will affect the agronomic practices and costs of producing hemp for grain and fiber.

Seeding rate for this hemp fiber budget was set at 40 pounds per acre, between the seeding rates for grain or fiber. The cost of seed reported by other states varies dramatically. We chose a seed price of \$3 per pound because of the relative scarcity of hemp seed. As seed becomes more plentiful, the cost of seed may merge closer to the expected price of the sold hemp grain, \$0.60 per pound in this budget.

Nitrogen (N), phosphorus (P), and potassium (K) fertilization is necessary for hemp production. No Missouri-specific recommendations exist yet. Purdue University states, "hemp requires about the same fertility requirements as a high-yielding crop of wheat, or corn."

No pesticides are currently labelled for use on hemp. This increases the risk of low yield because hemp is subject to weed, insect, and disease pressure. This budget assumes disking to kill weeds prior to planting. Weed management is currently limited to planting in a clean

**Table 2. Input assumptions used in Missouri industrial hemp for grain and fiber planning budget for 2020.**

Selected input quantities	Per acre	Selected input prices	Dollars per unit
Fiber yield, tons	3	Fiber price, per ton	125.00
Grain yield, pounds	750	Grain price, per pound	0.60
Seeding rate, pounds	40	Seed, per pound	3.00
Nitrogen rate, pounds N	150	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	50	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	40	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.6	Lime, per ton	20.00
Fuel for machinery and drying, gallons	5.26	Fuel, per gallon	3.04
Labor, hours	0.72	Labor, per hour	20.00

field, obtaining good emergence and assuming the quick-growing hemp will canopy and suppress weed growth. Any disease or insect problems will reduce yields, and the farmer will have no chemical options to control them.

This budget includes cost estimates for a required background check on the farmer and for registration of production with the Missouri Department of Agriculture. We assumed the farmer would send two samples to a lab to test for THC levels. Regulations require only one test per variety showing THC levels below 0.3 percent. The additional test is necessary if the first test shows the field exceeds legal limits. These regulatory costs are spread over 40 acres of hemp for grain and fiber production.

### Machinery considerations

This budget contains field operations that budgets from other states have recommended. The farmer is expected to apply nitrogen fertilizer with owned

equipment. P and K fertilizers are assumed to be applied by the fertilizer dealer. Preplant weed control is disking twice. If planting does not occur soon after disking, then weeds may emerge and a subsequent field cultivation may be necessary. The farmer is assumed to own the necessary grain drill to plant the hemp.

Because both grain and fiber are to be harvested, the farmer is expected to own a combine with a flex platform for hemp grain harvest and a mower and rake for fiber harvest. Anecdotal evidence indicates that harvesting hemp grain and fiber is more difficult than harvesting traditional grain and forage crops. Wrapping and fire danger have been reported. The costs of repair and time to cover a single acre might be greater than estimated in this budget. If contract specifications require on-farm hemp fiber storage, then additional tarping or shed costs may be necessary.

This budget also includes custom charges for large rectangular baling, grain drying and transportation of both grain and fiber to market.

**Table 3. Machinery used in Missouri industrial hemp for grain and fiber planning budget for 2020, on a per acre basis.**

Machinery activity (not custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>2</sup> (dollars)	Total costs (dollars)	Trips across field
Anhydrous application, 200 MFWD	0.08	0.64	3.49	7.30	10.79	1
Tandem disk, fold (21 feet), 160 MFWD	0.16	1.48	7.78	19.92	27.70	2
Presswheel drill (16 feet), 160 MFWD	0.15	0.61	4.81	10.05	14.85	1
Sickle mower, 75 HP tractor	0.12	0.35	3.95	6.90	10.32	1
Hay rake (30 feet), 40 HP tractor	0.08	0.14	1.94	3.06	4.98	2
Combine flex platform (25 feet), 375 HP	0.13	2.04	8.89	27.29	36.18	1
Dry fertilizer application, custom charge					13.50	2
Large rectangular bales, custom charge					51.00	
Moving large rectangular bales, custom charge					34.50	
Grain drying, custom charge					9.00	
Hauling grain to bin, custom charge					1.88	
Hauling grain to market, custom charge					3.38	
Seed cleaning, custom charge					30.00	
<b>Total<sup>3</sup></b>	<b>0.72</b>	<b>5.26</b>	<b>30.32</b>	<b>74.50</b>	<b>248.08</b>	<b>10</b>

<sup>1</sup> Machinery operating cost is the sum of fuel, repairs and maintenance, and the value of labor.

<sup>2</sup> Machinery ownership cost is the sum of overhead and depreciation.

<sup>3</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower.



## Sensitivity analysis

Uncertainty abounds when new crops are grown. Sensitivity analysis illustrates the impact on income over total costs of varying two critical factors. Yields and market price uncertainty significantly impact income. The gray highlights of Table 4 show the scenario that corresponds to this budget with 750 pounds of grain yield per acre and \$0.60 per pound grain price.

Table 5 looks at the uncertainty of both grain and fiber yield on income over total costs. The gray highlights of Table 5 show the scenario that corresponds to this budget with 750 pounds of grain yield per acre priced at \$0.60 per pound of grain and three tons of industrial hemp fiber priced at \$125 per ton.

**Table 4. Sensitivity analysis: income over total costs per acre.**

Market price (dollars per pound)	Grain yield (pounds per acre)				
	500	750	1,000	1,250	1,500
0.40	-52.94	47.06	147.06	247.06	347.06
0.50	-2.94	122.06	247.06	372.06	497.06
0.60	47.06	197.06	347.06	497.06	647.06
0.70	97.06	272.06	447.06	622.06	797.06
0.80	147.06	347.06	547.06	747.06	947.06

**Table 5. Sensitivity analysis: income over total costs per acre assuming grain price of \$0.60/pound and fiber price of \$125/ton.**

Fiber yield (tons per acre)	Grain yield (pounds per acre)				
	500	750	1,000	1,250	1,500
1	-202.94	-52.94	97.06	247.06	397.06
2	-77.94	72.06	222.06	372.06	522.06
3	47.06	197.06	347.06	497.06	647.06
4	172.06	322.06	472.06	622.06	772.06
5	297.06	447.06	597.06	747.06	897.06

# Industrial Hemp for CBD Planning Budget

This budget presents information useful to farmers considering industrial hemp production for cannabidiol (CBD). Table 1 presents income and cost estimates for industrial hemp CBD production in Missouri. Assumptions were based on price forecasts as of November 2019. Detailed assumptions are summarized in Tables 2, 3 and 4. Production was assumed to be done on 2.5 acres. Several assumptions used in this budget are from states such as Kentucky, Tennessee, and North Dakota that have recently grown hemp. Farmers should understand that these assumptions may not fit Missouri production. A sensitivity analysis of this budget is included in Tables 5 and 6. The two tables show how various yields and market prices impact profitability.

**Table 1. Missouri industrial hemp for CBD planning budget for 2020.**

	Dollars per acre <sup>1</sup>	Your estimate
<b>Income</b>		
Hemp CBD biomass	24,000.00	
<b>Total income</b>	<b>24,000.00</b>	
<b>Operating costs</b>		
Clones	7,623.00	
Fertilizer	102.00	
Irrigation - supplies and fuel	557.62	
Custom hire, machinery fuel, and variable costs	122.27	
Supplies	624.21	
Labor	3,718.98	
Registration and background check	320.00	
Sampling costs	600.00	
Operating interest	375.87	
<b>Total operating costs</b>	<b>14,043.95</b>	
<b>Ownership costs</b>		
Machinery ownership	41.90	
Real estate charge	125.00	
Drying and storage facility	1,950.00	
Irrigation well and pump	284.00	
<b>Total ownership costs</b>	<b>2,400.90</b>	
<b>Total costs</b>	<b>16,444.85</b>	
<b>Income over operating costs</b>	<b>9,956.05</b>	
<b>Income over total costs</b>	<b>7,555.15</b>	

<sup>1</sup> Totals may not sum due to rounding.

Written by  
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**Chase Morrison**, Student Assistant

Because this budget contains much anecdotal, as opposed to research-based information, we suggest that farmers customize the budget by using the Missouri Hemp Budget Generator Tool (<https://extensiondata.missouri.edu/Pro/AgBusinessPolicyExtension/Docs/IndustrialHempBudget.xlsx>).

This CBD budget assumes a “horticultural” style of growing hemp to maximize CBD production per plant. It is assumed that drip tape irrigation with plastic mulch will be used. The high financial costs and labor requirements likely limit the number of acres a farmer can grow.

## Income considerations

Missouri-specific CBD yield and variety trial information does not currently exist to guide producers. The yields used in this budget are estimates from other states, which also have limited research results and different growing conditions. Modest yields are used in this budget until the agronomic recommendations for Missouri have been better defined. The prices used in this budget for CBD hemp are the authors’ best estimates given limited market information.

The market for CBD is volatile as new demand and possible state and federal regulations influence prices. The market for CBD is also immature with little price history. It is suggested producers secure a contract to sell their hemp flower/CBD biomass before planting a crop. Use the contract price to estimate income.

Typical contracts require that farmers deliver high-quality material. In order to obtain the contract price, farmers need to be confident that they can meet the contract’s quality specifications for clean, dry flowers and biomass. We included a drying and storage facility in this budget to help maintain quality. Contract terms may require storage in a facility with a controlled environment.

Growing hemp includes a legal risk. Production of hemp is legal only if produced in accordance with Missouri law and the plant tests at or below postdecarboxylation 0.3% delta-9-tetrahydrocannabinol (THC). Under proposed regulations, the producer will be responsible for taking composite samples for each variety produced. Samples for varieties testing greater than 0.3% may result in crop destruction. Producers required to destroy varieties testing out of compliance must do so according to the Missouri Department of Agriculture’s destruction protocol. Costs for destroying the crop and destruction certification are the responsibility of the producer. Destruction will be verified by the Missouri State Highway Patrol or local law enforcement. No compensation is provided for the destroyed hemp crop.

## Agronomic considerations

The production contracts that farmers sign may specify the seed and variety planted, planting and harvesting dates, expected yields, and delivered biomass quality. These contract specifications will affect the agronomic practices and costs of producing hemp for CBD.

We assume that feminized clones selling for \$4 each are planted at the rate of 1,906 per acre. Obtaining feminized clones may be difficult given the increased demand for CBD and the difficulty of actually producing feminized clones. Farmers are encouraged to buy from clone distributors that have a reputation for delivering quality feminized clones. The presence of only a few male plants in a field can greatly reduce CBD yield.

Nitrogen (N), phosphorus (P), and potassium (K) fertilization is necessary for hemp production. No Missouri-specific recommendations exist yet.

No pesticides are currently labelled for use on hemp. This increases the risk of low yield because hemp is

**Table 2. Input assumptions used in Missouri industrial hemp for CBD planning budget for 2020.**

Selected quantities	Per acre	Selected prices	Dollars per unit
Biomass yield, pounds	1,200	Biomass price, per pound per percent CBD	2.00
CBD content, percentage	10		
Clones purchased	1,906	Clone, per plant	4.00
Nitrogen rate, pounds N	150	Nitrogen, per pound N	0.31
Phosphorus rate, pounds P <sub>2</sub> O <sub>5</sub>	70	Phosphorus, per pound P <sub>2</sub> O <sub>5</sub>	0.40
Potassium rate, pounds K <sub>2</sub> O	50	Potassium, per pound K <sub>2</sub> O	0.31
Lime rate, tons	0.6	Lime, per ton	20.00
Fuel for machinery and drying, gallons	2.9	Fuel, per gallon	3.04
Labor, hours	246.3	Unskilled labor, per hour	15.00

subject to weed, insect, and disease pressure. This budget assumes two disking activities to kill weeds prior to planting. In addition, plastic mulch is applied to the field with drip irrigation under the mulch. The plastic mulch is necessary for weed control because the planting rate is insufficient to create a canopy to combat weeds. Any disease or insect problems will reduce yields, and the farmer will have few chemical options to control them.

Drip irrigation assumes that an existing water supply can provide sufficiently clean water for drip lines in the field.

This budget also estimates the total number of labor hours needed to lay black plastic, plant, irrigate, harvest plants, dry plants, and harvest biomass. Two hundred forty-six hours per acre are estimated as necessary for CBD hemp production (see Table 3). Labor availability may limit the number of acres a farmer can devote to CBD hemp production.

This budget includes cost estimates for a required background check on the farmer and for registration

of production with the Missouri Department of Agriculture. We assumed the farmer would send 10 samples to a lab to test for THC and CBD levels. Regulations require only one test per variety showing THC levels below 0.3 percent. One additional test may be necessary if the first test shows the sample exceeds legal limits. The additional eight tests are for fine-tuning production activities to maximize CBD content and minimize THC content. These costs are spread over 2.5 acres of industrial hemp for CBD production.

## Machinery considerations

This budget contains field operations that budgets from other states have recommended (see Table 4). The farmer is expected to apply nitrogen fertilizer with owned equipment. P and K fertilization is assumed to be applied by the fertilizer dealer. Preplant weed control is disking twice.

**Table 3. Labor assumptions used in Missouri industrial hemp for CBD planning budget for 2020, on a per acre basis.**

Labor activity	Hours per acre	Dollars per hour	Total cost (dollars)	Description
Labor for pre-plant and planting	4.8	20	96.48	Disking, fertilizer, laying plastic and drip tape, planting clones
Labor for irrigation	10.0	15	150.00	
Labor for in-season weed control	50.0	15	750.00	Hand hoeing
Labor for in-season "trimming"	61.0	15	907.50	Two minutes per plant to increase bud development
Labor for harvest	61.0	15	907.50	Cut and haul plants to barn
Labor for post-harvest	61.0	15	907.50	Harvest dried material and load into totes
<b>Total</b>	<b>246.3</b>		<b>3,718.98</b>	

**Table 4. Machinery used in Missouri industrial hemp for CBD planning budget for 2020, on a per acre basis.**

Machinery activity (including custom fieldwork)	Labor (hours)	Fuel (gallons)	Operating costs <sup>1</sup> (dollars)	Ownership costs <sup>1</sup> (dollars)	Total costs (dollars)	Trips across field
Anhydrous application, 200 MFWD	0.08	0.64	3.49	7.30	10.79	1
Tandem disk, fold (21 feet), 160 MFWD	0.16	1.48	4.51	19.91	24.42	2
Black plastic mulch layer, 80 HP	1.41	0.38	1.15	7.35	8.49	1
Water wheel planter, 80 HP	3.17	0.38	1.15	7.35	8.49	1
Dry fertilizer, custom rate					13.50	2
Hauling hemp to processor, custom rate					100.00	
<b>Total<sup>2</sup></b>	<b>4.82</b>	<b>2.88</b>	<b>10.30</b>	<b>41.90</b>	<b>165.70</b>	<b>7</b>

<sup>1</sup> Machinery operating cost is the sum of repairs and maintenance. Machinery ownership cost is the sum of overhead and depreciation.

<sup>2</sup> Totals may not sum due to rounding.

Abbreviations: MFWD = modified front-wheel drive tractor; HP = horsepower.

Laying plastic mulch and transplanting feminized clones into the mulch requires special equipment expected to be owned by the farmer. Harvest involves cutting individual plants, which are put on trailers and transported to barns where they are dried. After drying, the flowers and other biomass will be stripped from the plants, put into totes, and stored. Hauling the totes is considered a custom charge, though the farmer may have sufficient truck equipment to haul the totes. We estimated that 1,300 square feet of drying and storage capacity per acre would be necessary for delivering quality biomass.

**Sensitivity analysis**

Uncertainty abounds when new crops are grown. Sensitivity analysis illustrates how two critical

factors can influence income. Yields and market price uncertainty significantly impact income. Assuming that CBD hemp yields 1,200 pounds of biomass per acre, Table 5 presents multiple income over total costs estimates. The gray highlights show the scenario that corresponds to this budget with 10 percent CBD yield per pound of biomass and a \$2 market price per CBD percentage per pound.

Income over total costs assuming \$2 per CBD percentage point per pound can be found in Table 6. The gray highlights show the scenario that corresponds to this budget where the CBD yield column (10%) intersects the biomass yield row (1,200 pounds). Table 6 can be used to estimate income over total costs for various biomass yields and CBD yield measurement.

**Table 5. Sensitivity analysis: income over total costs per acre, assuming 1,200 pounds of biomass per acre**

Market price (dollars per percent CBD content per pound)	CBD yield (percent CBD content per pound biomass)							
	7	8	9	10	11	12	13	14
1.00	-8,045	-6,845	-5,645	-4,445	-3,245	-2,045	-845	355
1.50	-3,845	-2,045	-245	1,555	3,355	5,155	6,955	8,755
2.00	355	2,755	5,155	7,555	9,955	12,355	14,755	17,155
2.50	4,555	7,555	10,555	13,555	16,555	19,555	22,555	25,555
3.00	8,755	12,355	15,955	19,555	23,155	26,755	30,355	33,955

**Table 6. Sensitivity analysis: income over total costs per acre, assuming \$2.00 per percent CBD.**

Biomass yield (pounds biomass per acre)	CBD yield (percent CBD content per pound biomass)							
	7	8	9	10	11	12	13	14
800	-5,245	-3,645	-2,045	-445	1,155	2,755	4,355	5,955
1,000	-2,445	-445	1,555	3,555	5,555	7,555	9,555	11,555
1,200	355	2,755	5,155	7,555	9,955	12,355	14,755	17,155
1,400	3,155	5,955	8,755	11,555	14,355	17,155	19,955	22,755
1,600	5,955	9,155	12,355	15,555	18,755	21,955	25,155	28,355



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