

In a year where feed is in short supply and grain prices are high, dairy and beef cattle producers begin looking for alternative feedstuffs. One option worth considering is cull potatoes. In Wisconsin we grow potatoes on about 62,000 acres and produce almost 26 million hundredweight (cwt) of potatoes or 1.3 million tons annually. The 2012 North American potato crop is expected to surpass 2011 production by 42.5 million cwt, or 8.1%. US production is forecast to increase by 8.4%, while the Canadian crop is up 7.1%. At 564.0 million cwt, the forecast would make this North America's largest potato crop since 2004.



Potatoes unsalable because they do not meet size, grade, or quality standards, or potatoes disposed of because of low market value due to over production are considered cull potatoes. This culling occurs at harvest as potatoes go into storage and then again when they are removed from storage and packed for sale. Those that are diseased, damaged, out of grade, or in oversupply are culled and discarded. 2012 is shaping up to have some overages and potato packers and processors will likely be looking to move those extra potatoes.

Feeding potatoes to dairy cattle: Potatoes can be incorporated into properly balanced dairy rations. Studies show it is best to limit the amount of potatoes fed to not more than 25 to 35 lbs. as-fed per cow per day or 5 to 8 lbs. on a dry matter (DM) basis. Introduce at a rate of two to three lbs. as-fed per head per day until desired rate is reached. Avoid replacing more than 20% of the overall ration DM with potatoes. Higher levels may cause milk fat depression. When feeding cull potatoes to dairy cattle it is best to use washed potatoes. Quite often potatoes coming out of storage are washed prior to sorting and thus the culls are washed as well. Check with your supplier.



Feeding potatoes to beef cattle: A total mixed ration of forage, grain, potato, minerals, and vitamins makes a good feedlot ration. Introduce into the ration with increasing amounts over a two to three week period. Start at 3 to 4 lbs. as-fed per head per day and increase to 25 lbs. per day for yearlings and 35 to 40 lbs. per head per day for 1100 lb. cows. Avoid replacing more than 50% of the ration on an as-fed basis with potatoes as performance usually drops beyond this point. Cull potatoes fed to livestock should be reasonably clean and free from dirt.

Nutritional value of potatoes: Potatoes are high in energy, very palatable, and medium to low in protein and vitamin A. Their high starch content puts them in the same category as feed grains in terms of energy on a DM basis. Potatoes should be considered a high moisture grain, not forage. DM content of potatoes varies from 15 to 25% depending on potato variety, storage conditions, and length of time in storage. Therefore, it takes 400 to 450 lbs. of potatoes as-fed to equal 100 lbs. of grain on an energy basis. On a DM basis, potatoes have as much crude protein as shelled corn, slightly more than corn silage, and about 60% that of alfalfa. Phosphorous content is equal to corn, corn silage, and alfalfa. Potassium content is as high as alfalfa, double that of corn silage, and over five times that of shelled corn. Typical nutrient analyses on a DM basis for cull potatoes is 10% crude protein, 3% ADF, 0.83 Mcal Nel/lb, 0.02% calcium, 0.24% phosphorous, and 0.4% EE.

Feeding and handling methods: Potatoes are most often fed in a total mixed ration. They can be used whole, chopped, or crushed. Avoid feeding whole frozen potatoes. If fed whole be sure to have adequate feed bunk space to avoid competition at the feeder. Competition increases the likelihood of cattle gulping down feed and increases the possibility of choking. Additionally, one can use a rail placed 2.5 to 3 feet above the bunk to prevent cattle from raising their heads while eating. As long as their heads remain down there is little chance of choking. When potatoes are left whole there may also be some sorting of the potatoes.

Chopping or crushing potatoes prior to feeding will eliminate the sorting issue and greatly reduce the risk of choking. Some possibilities for processing include using a tub grinder, running them through a forage harvester, crushing between rollers, or driving over the potatoes with a heavy tractor or loader. Keep in mind that once chopped or crushed, storage time will be greatly reduced.

Also of concern are green and sprouted potatoes. Avoid feeding large quantities of green or sprouted potatoes because they contain high levels of glycoalkaloids that can be toxic to cattle. Note: Potatoes exposed to light will turn green over time. Always monitor stockpiles if stored outside and uncovered.

Storing cull potatoes on the farm can reduce palatability. Especially during warm weather, potatoes will break down quickly reducing their feed value. Rapid feedout is recommended any time of year.



Ensiling potatoes: Potatoes can be ensiled to increase their storage life. For proper fermentation, potatoes need to be mixed with dryer forages to bring the overall moisture content down to 65 to 70% for bunker silos, 60 to 70% for silage bags, and 60 to 65% for upright concrete stave silos. One successful combination mixed 500 lbs. potatoes with one ton of corn silage. Another possibility is using 400 to 500 lbs. of chopped dry hay, corn stover, or straw per ton of potatoes. Ensiling and fermentation also reduces the risk of cattle choking.

What is a reasonable price to pay for cull potatoes?

Cull potatoes are considered an energy source in dairy and beef rations and contain as much protein as shelled corn on a DM basis. Most likely they will be used to replace corn in the diet. We can then calculate a comparable price for cull potatoes based on current prices of dry shelled corn and soybean meal using FeedVal 2012 http://dairymgt.info/tools/feedval_12/index.php (Table 1). FeedVal 2012 is a decision support tool developed by Victor E. Cabrera, L. Armentano, and R.D. Shaver, Department of Dairy Science, University of Wisconsin-Madison to evaluate the actual value of feed ingredients and to help producers, nutritionists, and farm consultants make economical optimal decisions for purchasing and using feed ingredients in feed rations.

Table 1. Value of one ton of cull potatoes based on shelled corn and 48% soybean meal prices.*

Price of soybean meal 48% ^Z (\$/ton)	Price of shelled corn ^Y (\$/bu.)										
	\$4.00	\$4.50	\$5.00	\$5.50	\$6.00	\$6.50	\$7.00	\$7.50	\$8.00	\$8.50	\$9.00
\$300	\$23.36 ^X	\$25.97	\$28.57	\$31.18	\$33.78	\$36.39	\$39.00	\$41.60	\$44.47	\$47.07	\$49.68
\$350	\$23.78	\$26.39	\$28.99	\$31.60	\$34.20	\$36.81	\$39.41	\$42.02	\$44.88	\$47.49	\$50.10
\$400	\$24.20	\$26.80	\$29.41	\$32.01	\$34.62	\$37.23	\$39.83	\$42.44	\$45.30	\$47.91	\$50.51
\$450	\$24.62	\$27.22	\$29.83	\$32.43	\$35.04	\$37.64	\$40.25	\$42.85	\$45.72	\$48.32	\$50.93
\$500	\$25.03	\$27.64	\$30.24	\$32.85	\$35.45	\$38.06	\$40.67	\$43.27	\$46.14	\$48.74	\$51.35
\$550	\$25.45	\$28.06	\$30.66	\$33.27	\$35.87	\$38.48	\$41.08	\$43.69	\$46.55	\$49.16	\$51.77
\$600	\$25.87	\$28.47	\$31.08	\$33.68	\$36.29	\$38.90	\$41.50	\$44.11	\$46.97	\$49.58	\$52.18

*Cull potato prices derived from FeedVal-2012 (http://dairymgt.info/tools/feedval_12/index.php)

^ZSoybean meal – 89% dry matter (DM), 54% crude protein (cp), and 1.00 Mcals/lb. Net Energy Lactation, 3X (Nel3)

^YShelled corn – 89% DM, 9% cp, and 0.91 Mcals/lb. Nel3x

^XCull potatoes – 15% DM, 10.5% cp, and 0.84 Mcals/lb. Nel3x

What about moisture content when figuring a price for cull potatoes?

As mentioned, potato moisture content can vary from 75 to 85% moisture or more depending on potato variety, storage conditions, and length of time in storage. In order to establish a comparable price across different moisture levels we need to work from a DM basis. For example: If a price of \$40 per ton of 85% moisture potatoes is established, each ton will contain 300 lbs. DM (2000 x 0.15). The value per pound of DM = \$0.133 (\$40/300). If moisture content is only 80%, then a ton will contain 400 lbs. DM and a comparable price would be \$53.33 per ton (400 x \$0.133). See Table 2 for price adjustments.

Table 2. Price adjustments for cull potato moisture.

Moisture	Base price per ton of cull potatoes at 85% moisture							
	\$20	\$25	\$30	\$35	\$40	\$45	\$50	\$55
87%	\$17.33	\$21.67	\$26.00	\$30.33	\$34.67	\$39.00	\$43.33	\$47.67
86%	\$18.67	\$23.33	\$28.00	\$32.67	\$37.33	\$42.00	\$46.67	\$51.33
85%	\$20.00	\$25.00	\$30.00	\$35.00	\$40.00	\$45.00	\$50.00	\$55.00
84%	\$21.33	\$26.67	\$32.00	\$37.33	\$42.67	\$48.00	\$53.33	\$58.67
83%	\$22.67	\$28.33	\$34.00	\$39.67	\$45.33	\$51.00	\$56.67	\$62.33
82%	\$24.00	\$30.00	\$36.00	\$42.00	\$48.00	\$54.00	\$60.00	\$66.00
81%	\$25.33	\$31.67	\$38.00	\$44.33	\$50.67	\$57.00	\$63.33	\$69.67
80%	\$26.67	\$33.33	\$40.00	\$46.67	\$53.33	\$60.00	\$66.67	\$73.33
75%	\$33.33	\$41.67	\$50.00	\$58.33	\$66.67	\$75.00	\$83.33	\$91.67

Factors to consider:

- Quality and moisture content of the potatoes must be monitored.
- Dry matter intake needs to be managed for maximum dairy and beef production.
- Potatoes are a high energy feed that must compete with more traditional feed grains.
- Price paid should allow for additional expenses of hauling, storage, and feeding.
- Account for potential shrinkage during storage and handling.
- Consistency of supply is also important to avoid abrupt ration changes.

Conclusion: Potatoes can be an economical substitute for grains. If fed at moderate levels animal performance should be similar to cattle fed equivalent amounts of dry grains. Check with your local potato grower for packing sheds interested in selling cull potatoes. For best results always feed a balanced ration.

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