UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY—COLLEGE OF AGRICULTURE

Organic Grains and Oilseeds for Animal Feed

Introduction

Organic food sales in the U.S. grew from $1 billion in 1990 to $25 billion in 2009 due to increasing demand for both plant and animal products. Organic food production in the U.S. is regulated by the USDA National Organic Program (NOP), which requires that grains fed to organic livestock be organically produced. As demand for organic animal products increases, so does the need for organic feed.

Marketing

Unprocessed organic feed grains and oilseeds can be sold under contract to feed mills, manufacturers, or brokers, but few mills in Kentucky are currently certified and equipped for handling organic feed. Another option is to sell feed crops directly to end users. Since many livestock producers prefer a pre-mixed feed blend, producers with processing and blending equipment could have a marketing advantage. Producers with storage facilities could have a marketing advantage as this allows them to hold their crop and sell when prices are strong.

Market Outlook

Continued expansion of organic meat and poultry markets is expected, bringing increasing opportunities for organic feed crop sales. Currently there is little organic feed crop production in Kentucky. Some local organic livestock producers grow their own grains for on-farm use; however, the majority purchase organic feeds that have been grown out-of-state. Most organic grain sold through Kentucky-based feed mills has been produced outside of the Commonwealth. The lack of local organic feed sources presents a potential market opportunity for organic grain and oilseed crop production in Kentucky.

The high price of organic feed, which can cost twice as much as conventional feed, is an indication of a limited supply. The absence of locally available, reasonably priced organic feed has constrained Kentucky's organic livestock sector.

Organic poultry, dairy, and pork producers have a particular need for organic feed. While organic poultry is pastured, grains are the primary feed. Some poultry farms

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have been discouraged from pursuing organic certification due to the high cost and limited availability of organic feed. Several poultry producers, who otherwise use organic methods, sell their birds as "natural" because they can use conventional feed at a considerable cost savings.

Kentucky's organic dairy sector has grown rapidly in recent years. NOP standards require dairy cattle to obtain at least 30% of their dry matter intake from pasture during the grazing season, but the off-season feed requirement can be approximately a bushel of grain per head per day. Organic pork producers present a largely undeveloped market.

Organic feed grain markets may be easier to identify and more accessible than those for organic food grains. In addition, the quality specifications for animal feed are less stringent than for grains and oilseeds destined for human consumption. Growers new to organic farming may find organic feed production less exacting and perhaps less risky than food grain production.

As with any niche market, prospective organic growers should identify a viable market before investing in a new enterprise. Contracts should clearly state the specific cultivars desired, quality standards, quantity expected, and whether the grain or oilseed is to be cleaned, processed, bagged, and/or stored prior to delivery or pick-up.

Production Considerations

Crop and cultivar selection

The most commonly used feed crops are corn and soybean. Alternative grain and oilseed crops that could be produced for animal feed include amaranth, barley, oats, pearl millet, rye, sorghum, spelt, sunflower seed, triticale, and wheat.

Growers should only select locally adapted cultivars that have the qualities in demand for the intended market. It is especially important in organic production to choose varieties with resistance or tolerance to commonly occurring diseases and insects. Other key desirable features include good standability, stress tolerance, suitable days to maturity, and yield. For University of Kentucky statewide variety trial research data, refer to the KY Statewide Trials page on the Department of Plant and Soil Sciences Grain Crops Extension Web site (see Selected Resources). When grown under contract, the processor generally specifies the hybrids to be planted.

Organic growers must document their effort to obtain certified organic seed, but individual organic certifiers may permit the use of untreated conventional seed if suitable organic seed is unavailable. Transgenic or genetically modified (GMO) hybrids are prohibited in organic production.

Site selection and preparation

Only land that has been free of prohibited substances (e.g. synthetic pesticides and artificial fertilizers) for 3 years can be certified for organic production. Selecting a growing site that is well-suited to the crop is especially important when utilizing organic methods. Avoid planting in fields with a history of aggressive weed or disease pressure.

Healthy soil is the key to successful organic production. Soil fertility is enhanced through cover crops, composts, green manure, properly aged animal manure, and approved natural fertilizers. A crop rotation plan designed to increase soil fertility and reduce weed pressure is a critical aspect of site preparation. Rotations have the additional benefits of improving plant health, disrupting insect and disease cycles, and enhancing biodiversity.

Well-planned rotations and soil-building cover crops are particularly important in replenishing the soil when growing soil-depleting crops, such as corn. NOP regulations require that all cover crops planted in a certified organic field must be grown from organic seed, if it is available.

While cover crops of grasses will increase organic matter, nitrogen-fixing legumes have the additional benefit of adding nitrogen. A healthy legume cover crop that has been incorporated into the soil prior to the cash crop can supply a large portion of its nitrogen needs. While soybeans fix nitrogen, little of it is returned to the soil. Supplemental organic nutrient sources include bloodmeal, feathermeal, fishmeal, cottonseed meal, and soybean meal.

Growers using traditional tillage techniques need to incorporate the cover crop 2 to 3 weeks in advance of planting to allow time for decomposition. This major tillage operation should be followed by lighter tilling to create a smooth, weed-free seedbed prior to planting. Growers using reduced tillage systems, such as no-till, must use non-chemical means of killing the previous crop. Mowing, undercutting, and rolling are effective replacements for herbicides in organic systems.

Planting and production

Plant density is an important consideration in organic systems. Higher plant populations tend to out-compete weeds more effectively. In addition, the canopy closes more quickly in narrow-spaced rows, reducing light penetration to the ground, and thereby inhibiting weed germination. These benefits must be weighed against the greater potential for disease and insect pests as well as machinery costs associated with narrower rows.

Varying the planting date can be a means of reducing the risk of some disease and pest problems. For example, planting small grains in Kentucky after the fly-free date not only reduces the risk of Hessian fly infestations, but it also reduces the risk of aphid infestations and barley yellow dwarf virus infections. On the other hand, late-planted small grain stands may be thinner with fewer tillers developing.

Seed depth can be a critical factor in organic systems. Seed planted too deeply will be slower to emerge and may result in damping-off problems. In addition, delays in emergence may mean plants face greater weed completion.

Some organic feed crops will need to be protected from pollen drift from neighboring GMO fields. This is mainly a concern for wind-pollinated crops, such as corn. Organic grain testing positive for GMOs due to contaminated pollen will be rejected as non-organic. The drift and run-off of prohibited substances, such as pesticides, from conventional farms can also compromise the crop's organic certification status. Preventative strategies include the use of buffer zones and barriers, altering drainage patterns, posting "no spray" signs, and cooperating with neighboring conventional farmers.

Growers with split operations (organic and conventional production on the same farm) must take additional steps to prevent the commingling of their two systems. Shared equipment must be decontaminated before use with organic crops.

Pest management

Pest management in organic production emphasizes prevention through good production and cultural methods. The goal is not necessarily the complete elimination of a pest, but rather to manage pests and diseases to keep crop damage within acceptable economic levels. Variety selection, plant density, planting date, and following good cultural practices are important to enhancing plant health; healthy vigorous plants are better able to survive pest infestations. Frequent crop inspections are essential to keeping ahead of potential problems; monitoring pests requires accurate identification.

Disease and insect pests will vary depending on the crop. Common pest management practices include crop rotation; removal or incorporation of crop residues; use of resistant cultivars; timely planting; and avoidance of stresses due to poor fertility, improper soil pH, or inadequate moisture. Organic growers use a range of

Integrated Pest Management (IPM) practices, including regular field scouting.

The main challenge to organic growers is often weed control. If left unchecked, weeds compete with plants for water and nutrients, harbor insect and disease pests, and reduce air circulation. Since synthetic herbicides cannot be used, organic growers will need to manage weeds with alternative methods. An important first step is to avoid planting in sites with high noxious perennial weed populations. Along with site selection, site preparation should be aimed at making sure existing weeds are under control. The seedbed needs to be free of weeds. Managing weeds during the first 4 to 6 weeks after planting is particularly important to maintaining high crop yields. Cultivation, propane torches or flame weeders, and mowing are methods of reducing weed problems during the growing season.

Harvest, storage, and processing
Harvested grains and oilseeds must be undamaged and free of weed seed, ergot, mycotoxins, and other contaminants. All equipment, storage areas, packaging materials, and transportation vehicles must comply with NOP standards. This is also true of processing areas and mills. Growers with split operations must either use separate equipment and facilities for these operations or decontaminate equipment before it is used for organic products. Additionally, producers who share harvest equipment with neighboring farms or who hire custom operators must be diligent in preventing commingling of organic and non-organic grains. The integrity of organic crops must be maintained through all stages of production, harvest, storage, and transportation.

Where the possibility of cross pollination with GMO crops exists, it is often advisable to harvest the outer edges of the field first and market it as conventional grain. This can reduce the risk of contaminating the organic crop with accidental GMO cultivar crosses. Since combines can hold several bushels from the previous harvest, thorough cleaning of equipment is crucial when switching from conventional to organic. Organic grains and oilseeds contaminated with GMOs can result in the rejection of the entire load.

Processing feed can involve cleaning, conditioning, milling, extrusion, and/or bagging. Processing areas and bagging materials must be protected against potential contamination from prohibited substances and commingling with conventional grains.

Labor requirements
About 25% more labor is required for organic grain production than for conventional; expect about 2 to 2½ hours per acre. Small farms tend to use more labor per acre than large farms.

Economic Considerations

Initial investments include land preparation (including cover crop seeding), purchase of seed, and organic fertilizers.

Total 2010 variable costs for organic field corn (for feed) were estimated at $262 per acre with fixed costs of approximately $100 per acre. Presuming a harvest of 100 bushels sold at $6.00 per bushel, gross returns would equal $600 per acre. Returns to operator labor, land, capital and management would be approximately $238 per acre.

For organic soybeans, total 2010 variable costs were estimated at $200 per acre with fixed costs of approximately $110 per acre. Assuming a harvest of 30 bushels at $16 per bushel, gross returns would equal $480 per acre. Returns to operator labor, land, capital and management would be approximately $170 per acre.

Total 2010 variable costs for organic wheat were estimated at $215 per acre with fixed costs of approximately $70 per acre. Assuming a harvest of 45 bushels of wheat per acre at $7 per bushel and $100 income from straw, gross returns would equal $415 per acre. Returns to operator labor, land, capital and management would be approximately $130 per acre.

Selected Resources

- Corn and Soybean Budgets (University of Kentucky, 2011)
http://www.ca.uky.edu/cmspubsclass/files/ghalich/Budgets-Corn_and_Soybean.xls
- Grain Crops Extension (University of Kentucky)
http://www.uky.edu/Ag/GrainCrops/welcome.htm
- KY Statewide Trials (University of Kentucky)
http://www.uky.edu/Ag/GrainCrops/varietytesting.htm
- Wheat and Wheat Double-Crop Soybean Budgets (University of Kentucky, 2011)
http://www.ca.uky.edu/cmspubsclass/files/ghalich/Budgets-Wheat_Dbl-Crop.xls
- Organic Marketing (Kentucky Department of Agriculture)
http://www.kyagr.com/marketing/plantmktg/organic/index.htm
- Cover Crops and No-till Management for Organic Systems (Rodale Institute, 2011)
http://66.147.244.123/~rodalein/wp-content/uploads/2012/12/TechBulletin_orgnotill_201112.pdf
- Disease and Insect Management in Organic Small Grains (ATTRA, 2011)
https://attra.ncat.org/attra-pub/summaries/summary.php?pub=363
- GMO Contamination Prevention—What Does it Take? (University of Minnesota, 2012)
http://swroc.cfans.umn.edu/prod/groups/cfans/@pub/@cfans/@swroc/documents/article/cfans_article_390283.pdf
- Marketing Organic Grains (ATTRA, 2005)
https://attra.ncat.org/attra-pub/summaries/summary.php?pub=101
- Marketing Organic Grains (Midwest Organic and Sustainable Education Service, 2009)
http://www.mosesorganic.org/attachments/MOSES%20fact%20sheet/10MarketGrains.pdf
- National Organic Program (USDA-AMS)
http://www.ams.usda.gov/nop
- Organic Crop Production Enterprise Budgets (Iowa State University, 2008)
http://www.extension.iastate.edu/agdm/crops/html/a1-18.html
- Organic Feed-grain Markets: Considerations for Potential Virginia Producers (Virginia Tech, 2009)
http://pubs.ext.vt.edu/448/448-520/448-520.html

Organic Field Corn Production (ATTRA, 2002)
https://attra.ncat.org/attra-pub/summaries/summary.php?pub=90

- Organic Grain Crop Budgets (North Carolina State University, 2007)
http://www.organicgrains.ncsu.edu/production/cropbudgets.htm
- Organic Grain Production Guide (North Carolina State University, 2005)
http://www.organicgrains.ncsu.edu/cropproduction/Production%20Guide/tableofcontents.htm
- Organic Small Grain Production Overview (ATTRA, 2012)
https://attra.ncat.org/attra-pub/summaries/summary.php?pub=385
- Organic Weed Control Toolbox (eXtension, 2010)
http://www.extension.org/article/18532
- Overview of Cover Crops and Green Manures (ATTRA, 2003)
https://attra.ncat.org/attra-pub/summaries/summary.php?pub=288
- Profitability of Transitioning to Organic Grain Crops in Indiana (Purdue University, 2010)
http://www.agecon.purdue.edu/extension/pubs/paer/2010/february/alexander.asp
- Protecting the Integrity of Organic Grains During Harvest (Rodale Institute, 2004)
http://newfarm.rodaleinstitute.org/columns/inspector/2004/0804/081704.shtml

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Reviewed by Mike Bomford, Extension Specialist, Kentucky State University **February 2011**

Photos: soybean seed courtesy of Illinois State University; pearl millet seed by J. Wilson, USDA-ARS; oat seed courtesy of Wikimedia Commons; and corn seed by Paul Vincelli, University of Kentucky

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For additional information, contact your local County Extension agent