University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Center for Crop Diversification Crop Profile

Beekeeping and Honey Production

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Introduction

Apiculture, the study and maintenance of honey bees, often begins as a hobby, with beekeepers later expanding their interest into small businesses. A beekeeping enterprise can provide marketable honey and serve as a source of pollinators for nearby cultivated crops.

Market Outlook

Honey production in the U.S. was valued at more than $387 million in 2014, according to USDA, with Kentucky producing about $1 million. The value of honey production is likely to be greater as these data do not account for honey produced by some very small operations, those with five or fewer hives. The honey industry is technically divided into three categories: commercial (over 200 hives), sideliner (30-199 hives), and hobbyists (1-30) hives.

Attention given the U.S. beekeeping industry, in the wake of disease and other challenges to bee populations, has created consumer interest in eating honey as a way to support local and national beekeepers. The actual economic value of beekeeping is far greater than the value of honey produced. A Congressional Research Service report estimated a direct benefit of $15-$20 billion for the pollination provided by honey bees.

Americans consume more than one pound of honey annually, according to the National Honey Board. Total

U.S. consumption is 400 million pounds annually, but domestic beekeepers can produce only about 150 million pounds, so U.S. beekeepers must compete with imported honey. Local and specialty honey continue to maintain consumer popularity, and good marketing practices can help beekeepers establish relationships with local buyers. A beekeeper producing a quality product can easily sell out before the next season's crop is ready. Honey produced from the nectar of certain trees, such as tulip tree, sourwood, and basswood, often brings a premium price. Honey prices have increased in recent years.

Market options include farmers markets, health food stores, restaurants, roadside stands, agritourism sites, and Kentucky-crafted stores or booths. Beekeepers producing large crops may consider selling honey in bulk

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to a honey packer. Honey may also be added to community supported agriculture (CSA) memberships and included in gift baskets. Honey can also be purchased wholesale from local beekeepers and retailed as part of the product mix at an on-farm market or other direct farm market outlet.

Marketing

Honey can be marketed in several forms. Comb Honey consists of chunks of honey-filled combs taken directly from the hive. Because it is the easiest to produce and the cheapest to package and market, comb honey is often recommended for beginning beekeepers. While the price is not as high as for other types, there is usually a ready market. Comb honey is often preferred by older adults. According to Kentucky State Apiarist Dr. Tammy Horn Potter, it is one of the first products to sell out at the Kentucky State Beekeepers Association Booth at the Kentucky State Fair. Extracted Honey, which is generally preferred by most consumers, is the liquid portion once it has been separated from the comb. Specialty products such as honey butter and whipped honey are made from extracted honey. Chunk honey is a combination of comb honey and extracted honey bottled together. Like comb honey, chunk honey is very popular; the presence of the beeswax comb guarantees authenticity.

The U.S. imports a substantial amount of Beeswax, a secondary product of bee activity. Market potential persists for quality, domestic beeswax. The beekeeping industry, which uses beeswax to form wax foundation for the frames in the hive, is one of the largest users of this byproduct. Beeswax candles are also popular home and gift items.

Royal Jelly, a substance secreted by worker bees to feed the queen, and Bee Pollen (more accurately, "bee-collected pollen"), are being promoted as dietary supplements. Royal jelly production can be expensive and labor-intensive with limited markets. However, collecting pollen is simple. With a little knowledge about collection and marketing, bee-collected pollen may bring a premium price, as it is quite popular and supply does not keep up with demand.

Renting out hives to orchardists and farmers for pollination purposes can provide another source of income. In addition, experienced beekeepers could consider selling bees to other beekeepers. These are sold as a small nucleus hive, or "nuc," that is easily transported and later expanded to a full-size hive. Selling queens is another way experienced beekeepers may profit from their enterprise. The technique for rearing queens is taught in workshops at Kentucky State University.

Production considerations

Site selection and obtaining bees

Ideally, hives should be located within 1 to 2 miles of a succession of spring, summer, and fall nectar sources. While previous guidelines indicated that hives need to be located in a shaded area, the latest information suggests that it is best to place them in full sunlight to help combat the small hive beetle. A source of water, such as a dripping hose, should be located nearby. Avoid locations near large rivers, highways, public areas, or on hilltops. Hives should be protected against cold winter winds. Hives located near cultivated crops are potentially in danger of exposure from insecticides. Obtaining the cooperation of the grower and/or pesticide applicator will be essential to avoid bee losses.

Bees can be captured from a swarm, obtained from an established beekeeper, or purchased from a commercial bee supply company. Along with the hive and hive parts, other necessary

equipment includes a smoker, hive tool, and protective gear for the beekeeper.

Sources of honey
Honey color and flavor are determined by the various plant species visited by the bees. It is not economically practical to produce a crop solely for honey production; however, cultivated plants grown for other purposes can provide an important source of nectar. Common nectar sources include agricultural crops, tree fruits, small fruits, ornamentals, and wild flowers. One hive will require several acres of flowering plants to provide it with sufficient nectar.

Management
The beekeeper will need to regularly open each hive to examine the condition of the brood, check food stores, look for signs of disease and pests, and to perform various hive maintenance tasks. With erratic springs impacting mating yards, it is not unusual to have to replace queens every year. While some inspections can be brief, it is important that the hive be examined in a timely manner throughout the year.

Swarming, which greatly reduces hive strength, is most often associated with overcrowding in the hive. It can be avoided with proper management practices. However, swarming can be a source of free bees for beginning beekeepers, or a great way to expand an apiary.

Pest Management
The most common brood diseases in Kentucky are chalk brood, American foulbrood, European foulbrood, and mite-vectored disease known as snotty brood. Other diseases include nosema and several viruses strongly correlated with the presence of varroa mites. Because mites vector viruses, both varroa and tracheal mites can result in high bee hive mortality. The small hive beetle is a widespread pest in Kentucky. Recent successes in bee breeding have provided strains of bees that are mite-resistant and disease-resistant. Obtaining bees and queens from a reputable source, frequent inspections, and proper management helps prevent bee losses.

Skunks and mice are common in rural areas, but can be excluded with screens or other barriers at the front of the hive. Bears, which are now common in eastern Kentucky and have also caused damage in Central Kentucky, can be kept away with electric fences, but they should be built before bears locate hives. It is very difficult to build any type of fence to keep bears out after they have located a hive.

Harvesting and processing honey
Honey is considered ripe when the bees cap the honey. Supers, the chambers used to store surplus honey in the hive, can be removed from the hive once they are completely capped over. The average yield in Kentucky is about 50 pounds of honey per hive per year. The honey should be processed soon after harvesting and then stored in sealed containers in a warm, dry place or freezer until marketed.

Pieces of sealed and undamaged honeycomb can be cut into neat pieces, packaged in plastic wrap or boxes, and sold as comb honey. Liquid honey may be separated from the combs using professional extracting equipment. Small-scale beekeepers, however, can do the job cheaply by crushing the combs and letting the honey run slowly through strainers. Extracted honey is packaged in clear glass or plastic containers. Chunk honey is prepared by placing a portion of honeycomb in a jar and filling up the rest of the jar with the extracted liquid honey.

Beeswax is collected after all honey has been removed from the combs. It should be cleaned, melted down, and strained. It stores well at room temperature in the form of large chunks. If beeswax foundation is left in the frame after harvest, it needs to properly stored with Paramoth to prevent wax-moth from destroying combs.

Labor requirements
Labor needs for beekeeping and honey production are quite variable. For example, the time spent

establishing new hives will depend on materials used. In addition, considerable time can be spent simply driving between hive locations. While it is difficult to estimate exact labor times, beginning honey producers should expect to spend at least 28 hours per year managing two hives. This includes time caring for bees and harvesting. Labor time per hive should decline somewhat with experience and as more hives are added.

Honeycomb processing times will vary depending on the type of honey produced. Producers should expect to spend about an hour per hive processing comb honey. Additional time will be required for further processing.

Economic considerations

Initial investments include the purchase of hives, beekeeping equipment, bees, and queen. The Kentucky Department of Agriculture has suggested budgeting a startup cost of at least $500 for two hives, and $175 for each additional complete hive. Producers should be aware that most first-year hives are not honey production hives.

Pressing or extracting equipment will represent an additional investment for producers of chunk and extracted honey. The least expensive honey extractors with associated equipment cost about $500. However, extractors can be borrowed from other beekeepers and some local beekeeping associations make them available to members. A grant from the Kentucky Agricultural Development Board to Kentucky State University has allowed the construction of a number of large-capacity honey extraction units. These units have been established at selected county Extension offices around the state. Contact your local county Extension office or beekeepers association to learn if an extractor is available. There are other funding opportunities through the County Agricultural Investment Program (CAIP) and the Kentucky Department of Agriculture Kentucky Proud Promotional Grant. Please see Selected Resources below for links to these programs, Extension offices, and beekeepers associations.

Producers wishing to purchase their own extraction equipment will need at least 40 hives to recoup the typical costs of extraction equipment in three years or less. For producers wanting to invest in extraction equipment but wishing to keep fewer hives, a 10-hive production and extraction system would require an initial investment in the $4,000 range; a 50-hive system would require an investment approaching $6,000. There are definite economies of scale and cost savings realized by keeping more hives for the purpose of extraction. Based on a price of $2 per pound, extracted honey producers using this complete system could realize returns to land, labor, and management exceeding $100 per hive, provided hives are rented for pollination at an annual rate of at least $60 per hive. Recent retail honey prices up to $7 per pound in Kentucky could create significantly greater returns for well-managed honey operations.

Producers of comb honey will need at least one year of production to cover the cost of hive materials. This will be realized in the second year of keeping hives since the first year is devoted to building up hives for winter survival and producing a honey crop on the following year's nectar flow. At a price of about $2 per pound of comb honey, a 10-hive comb honey system can yield returns to land, labor, and management exceeding $50 per hive for honey production and returns exceeding $125 per hive when hives are also rented out for pollination. Direct marketing of honey and related products can substantially increase price per pound and profitability per hive.

Beekeepers selling honey in bulk to a honey packer can avoid the cost of bottling and marketing the honey in jars, but will obtain only $2 to $2.50 per pound for 55-gallon drums of honey. If local markets are available for bulk honey, savings on packaging and direct marketing costs can make bulk production attractive. There may be a local

market for selling honey to other producers who have established accounts and need more honey.

Selected Resources

- Beginning Beekeeping for Kentuckians (University of Kentucky, 1996) http://www.ca.uky.edu/agc/pubs/ent/ent41/ent41.pdf
- Honey Bee Program and Kentucky State Apiarist (KDA) http://www.kyagr.com/statevet/honeybees.html
- Kentucky Beekeeping—A Guide for Beginners (Kentucky State University, 2010) 4.9 MB file http://www.kyagr.com/statevet/documents/OSV_BEE_BeekeepingGuide.pdf
- Kentucky State Beekeepers Association http://www.ksbabeekeeping.org
- Local Beekeeping Associations in Kentucky http://www.ksbabeekeeping.org/local-beekeeping-organizations/
- Kentucky County Extension Offices http://extension.ca.uky.edu/county
- Kentucky Department of Agriculture Kentucky Proud Promotional Grant instructions http://www.kyagr.com/marketing/documents/KYP_GrantApplication.pdf
- Kentucky Agricultural Development Fund County Agricultural Investment Program (CAIP) http://agpolicy.ky.gov/funds/Documents/caip-current/caip-16_animal-small.pdf (see Page 4)
- Agricultural Alternatives: Beekeeping (Pennsylvania State Extension, 2012) http://extension.psu.edu/business/ag-alternatives/livestock/additional-livestock-options/beekeeping
- American Beekeeping Federation (Georgia) http://www.abfnet.org
- Bees (Agricultural Marketing Resource Center, 2015) http://www.agmrc.org/commodities-products/livestock/bees-profile/
- Beekeeping Enterprise Budget (Iowa State University Leopold Center, 2010) 1.3 MB file http://lib.dr.iastate.edu/extension_pubs/41/
- Honey Bee Program (University of Georgia) http://www.ent.uga.edu/bees/
- Honey Bees and Beekeeping (University of Georgia, 2010) http://www.caes.uga.edu/Publications/displayHTML.cfm?pk_id=6165
- Income Opportunities in Special Forest Products – Chapter 10: Honey (USDA, 1997) http://www.fpl.fs.fed.us/documnts/usda/agib666/aib66610.pdf
- Honey Bee Colonies (May 2016) http://usda.mannlib.cornell.edu/usda/current/BeeColonies/BeeColonies-05-12-2016.pdf
- Honey Production http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1191

Reviewed by Tammy Horn Potter, State Apiarist, Kentucky Department of Agriculture
Photos: David Cappaert, Michigan State University (bee on flower) & Carl Dennis, Auburn University (bees on comb), courtesy of Bugwood.org; and Stephen Patton, UK Ag Communications (honey jars)
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