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More About Pure Honey

Honey produced and sold by U.S. beekeepers has a reputation of being among the finest in the world. Purchasers do not have to worry about non-honey items in the barrels and the honey comes from natural sources. However, worldwide, and more recently at home, concerns over “terrorism” have cause governments to tighten up on producers, handlers and processors of food products. In the U.S., that is Part 110 – Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food. Part 110 comes from Food and

Drug’s Title 21 – Food and Drugs, Chapter I – Food and Drug Administration, Department of Health and Human Services – Continued. Anything in **bold print** is just my emphasis.

Talking with honey packers, about the only problem they find with our honeys are microbial counts that are too high. We have been schooled that microbes cannot grow in ripened honey, so what is being measured? As documented in a recent European scientific paper, spores of soil-inhabiting microbes can be found in substantial numbers in some lots of honey. When the honey is diluted and plated on media, the bacteria grow into colonies. They also grow when honey is diluted and mixed into foods while they are being processed. These microbes should be present only in exceedingly low numbers, since honey under the capping does not have many of them.

For our purposes the word “dust” is most important. The spores of soil-inhabiting microbes are quite resistant and very small in size. They blow around in the air and they are carried around on anything that touches the ground. So, it is imperative for beekeepers to harvest, transport, uncap,

extract and containerize their honey with the least exposure to dust and dirt as possible. It takes a little planning, perhaps some equipment or building modifications, and attention to details to accomplish these (no dust) goals. However, the following is what is expected of other food handlers and we are going to be caught up in this web.

110.10 Personnel – Briefly (the rules are much more specific), any person who is sick or has open wounds should not be working with the food product. People who are handling food should be very clean – wearing correct outer garments to come into contact with the food, washing and sanitizing hands before and after handling the food or if hands become soiled or contaminated. Food preparation clothing should be different from your street clothes, which should not be around the food. Remove all jewelry and anything else that might fall into the food product. Proper intact gloves, hair nets, beard covers, etc. should be worn. No eating food, chewing gum, drinking beverages, or using tobacco around the food line. Taking precautions to prevent contamination of the food by microbes, perspiration, hair, cosmetics, tobacco, chemicals or medicines applied to the skin.

110.19 Exclusions – Briefly, operations engaged solely in harvesting, storage, or distribution of “raw agricultural commodities” will be excluded, but only if the product is going to be further “cleaned, prepared, treated, or otherwise processed” before going to market.

110.20 Plant and Grounds – Briefly, equipment has to be stored properly and the weeds and other debris have to be kept away from the building to prevent attracting, providing a mating place, or harborage for pests. Roads, yards, and parking lots should

“not constitute a source of contamination.” Drainage should prevent water buildup that could contaminate feet or equipment or provide a breeding place for pests. Any waste should be handled in a manner that will not “constitute a source of contamination in areas where food is exposed.” The facility must be large enough to be able to place and store food handling equipment in such a way that it can be cleaned readily. Probably, for honey the following is most important: “... including the separation of operations in which contamination is likely to occur, by one or more of the following means: location, time, **partition**, air flow, **enclosed systems**, or other effective means.” The facility should be “constructed in such a manner that floors, walls, and ceilings may be adequately cleaned and kept clean and kept in good repair.” Adequate lighting is required in hand-washing areas, dressing and locker rooms, and toilet rooms and in all areas where food is examined, processed or stored and where equipment or utensils are cleaned. Safety-type bulbs and fixtures (skylights) must be used to protect against food contamination in case of glass breakage. Odors and moisture must be controlled by fans in such a way that the moving air does not contaminate the food. Screen or otherwise keep pests out of the food facility.

110.35 Sanitary Operations – Briefly, equipment and utensils coming into contact with the food should be clean and sanitized. “Cleaning compounds and sanitizing agents ... shall be free from undesirable microorganisms and shall be safe and adequate under the conditions of use.” “No pests shall be allowed in any area of a food plant.” Guard or guide dogs can be around as long as they are confined to areas where they won’t contaminate the food. Insecticides and rodenticides are last ditch measures – proper sealing of facility is preferable. “In wet processing, ... utensils and food-contact

surfaces of equipment shall be cleaned and sanitized as necessary.”

110.37 Sanitary Facilities and Controls – Briefly, the water supply to the facility has to be plumbed correctly (backflow and cross contamination prevention), all fixtures working properly, and the water must pass inspections for water quality. There should be floor drains where floors are going to be washed to remove spilled food. The sewage system has to be adequate. Toilets have to be kept very clean, doors to toilet room must be self-closing, and doors should “not open into areas where food is exposed to air-borne contamination, except where alternate means have been taken to protect against contamination (such as double doors or positive air-flow systems).” There is a lot of emphasis on hand washing: water temperature, disposable or immediately dryable towels, refuse containers that prevent contamination, and written, posted instructions on how to properly clean hands.

110.40 Equipment and Utensils – Briefly, all equipment has to be cleanable and properly maintained. Lubricants, fuels, metal fragments, contaminated water, etc. should not get into the food. Seams on food-contact surfaces should be smooth and provide no place for microbes to grow. “Compressed air used to clean food-contact surfaces or equipment shall be treated in such a way that food is not contaminated with unlawful indirect food additives.”

110.80 Processes and Controls – Briefly, each facility should have a quality control supervisor who oversees the sanitation of the food line. “Chemical, microbial, or extraneous-material testing procedures shall be used where necessary to identify sanitation failures or possible food contamination.” Adulterated foods will be rejected or, if possible, processed to eliminate the

contamination. “Raw materials and other ingredients shall be inspected and segregated or otherwise handled as necessary to ascertain that they are clean and suitable for processing into food and shall be stored under conditions that will protect against contamination and minimize deterioration.”

“Containers and carriers of raw materials should be inspected on receipt to ensure that their condition has not contributed to the contamination or deterioration of food.”

Raw materials held in bulk will be at temperatures and relative humidities that prevent the food from becoming adulterated. Raw materials shall not contain levels of microbes that may produce food poisoning or other diseases of humans. Raw materials can not have natural toxins, like aflatoxins, in them. Storage containers should be handled in such a way that they do not introduce contaminants (dust) into the food. Sieves, traps, magnets, electronic metal detectors or other suitable means can be used to protect against metal contamination. Food should be contained only in safe, suitable food containers and packaging materials. Physical protection should exist to prevent contamination, **particularly air-borne contamination.**

“Food-manufacturing areas should not be used to manufacture nonhuman food-grade animal feed or inedible products unless there is no reasonable possibility for the contamination of human food.”

110.93 Warehousing and Distribution – “Storage and transportation of finished food shall be under conditions that will protect food against physical, chemical, and microbial contamination as well as against deterioration of the food and the container.”

110.110 Natural or Unavoidable Defects in Food for Human Use that Present no Health Hazard – Briefly, Food and Drug is supposed to establish maximum levels of such defects. Blending food out of compliance, with food

in compliance, to meet the tolerance level is not acceptable. Current defect action levels may be obtained from the Center for Food Safety and Applied Nutrition (HFS-565), Food and Drug Administration, 200 C Street SW, Washington, DC 20204.

After reading this, I am sure that you can see many ways in which you could improve your honey handling practices to better meet these criteria. Several years ago the Board of Directors of the American Beekeeping Federation adopted a five and one-half page document titled: Uniform Sanitation Code for Honey Houses (Honey Extracting Facilities) that addressed most of the Food and Drug concerns. Now, the National Honey Board has appointed a Subcommittee to develop guidelines that deal with maintaining the integrity of honey from the time it is being deposited in the combs to the time that it is in the bulk containers leaving the beekeeper's property. It is likely that the document will incorporate much of the ABF Uniform Sanitation Code.

Insurance Review

Arriving a day after the beginning of the CSBA Convention, I began keeping notes with the presentation on insurance needs of a beekeeper. Obviously, after years with no claims, it seems like too much money is paid on insurance. Then, when there is a loss, it seems that the coverage is never really enough.

The costs of replacement on buildings, vehicles, etc. keep increasing steadily. Many insurance policies have clauses that lead to severe financial penalties if the cost of replacement exceeds your policy by the specified amount (frequently, at least 90% of the replacement cost of the loss must be covered by the policy). For hives,

cost of coverage on your premises is lower than off your premises. Theft, flood and bears are normally not covered. [This may be a year when theft really becomes a headache – large demand; sharply reduced supply.] If someone else trucks your bees, who has the cargo insurance – you or the trucker? And “lost income” coverage is a good thing to have, if the bees could be lost in an accident.

Liability insurance actually is fairly complex coverage. Accidentally setting fire to a grower's orchard, people stung by your bees, somebody tripping and falling on your property are pretty routine. But, what about farmers' markets and roadside stands? Don't necessarily expect your farm liability policy to cover those (Travelers – yes; Allied – no). And product liability on your product (honey)? Many buyers may require up to \$2 million in coverage. You will probably need a second policy in some cases, or at least a rider.

Personal liability needs attention, too. The most numerous claims are: 1. swimming pools (crack in fence or gate unlocked), 2. dogs (\$500,000 to \$1.2 million for “stress” attributed to bite), 3. guns (including BB and pellet), and 4. rental properties (often lead-based paint related).

Automobile insurance presents problems to the actuaries. They can estimate quite well how many fender benders and broken windshields are apt to occur over a year. But, they never know how many random, unpredictable multi-million dollar crashes are going to occur.

Related to employees, there is workman's comp and you can get payroll insurance that is linked to the company's annual payroll.

Then there is “umbrella” coverage. It sort of covers nearly everything the specific policies don’t. The price is pretty reasonable, too – about \$350-500 per \$1 million in coverage.

The risk management tools that were suggested were: 1. avoidance of the accidents, in the first place, 2. control over what is going on in your business (who drives your vehicles), 3. separation (smoke away from buildings; keeps weeds down around buildings, etc.), 4. raise deductibles, 5. transfer the risk (try to get “hold harmless” clauses in your contracts), 6. be sure you know what is covered by farm liability and personal liability (you still may need a rider for the roadside stand, farmers’ market, etc.), and 7. “Don’t risk a lot to save a little” (cheaper is not always better). Remember – STUFF HAPPENS!

National Honey Board Projects

At the November 2004 CSBA Convention, National Honey Board CEO, Bruce Boynton, discussed the direction the Honey Board hopes to take in the future to try to ensure the purity of U.S. honey. Bruce reminded us that honey can be “adulterated” for economic gain or “contaminated” by chemicals not ordinarily contacted by honey bees in a pristine environment. There seems to be no end to the ways that individuals try to adulterate honey for economic gain. With honey prices up a bit from historic lows, one importer even tried to sell pure maltose as honey. Actually, maltose can pass the usual chemical tests that we use to find “funny honey.” But, it is very viscous, has little taste, has very little fructose and glucose, and of course the maltose is way above the amount commonly found in honey. However, maltose, high fructose corn syrup, and many other cheap sweeteners are not

detrimental to human health, so the federal government is not too concerned about their presence in honey. It appears as though we might get more assistance from the state level.

The National Honey Board has approached the honey purity problem from a number of directions. A committee completed its work on “Ultrafiltered Sweetener from Honey.” Another committee is looking into questions surrounding the labeling of honey. An attempt may be made to request that any food item including “honey” in its product name be required to show the % honey, by weight, of the product on the FRONT of the packaging. “Country of Origin” labeling is still a big question, too. Must there be separate labels for each blend, or would it be adequate for the label to state that the honey is a blend of honeys that “may contain honey from V, W, X, Y, or Z (countries)?

The Standards of Identity committee has spent a great deal of time and energy trying to define honey, as it is produced in the U.S. However, the federal government seems to be little interested in adopting any more “identities” for foods. The last one accepted was for white chocolate (an oxymoron, at best). Actually, the government is trying to get rid of standard identities as quickly as they can. No identities means no reason to run very expensive tests on food items, anymore.

Then there is the Quality Assurance committee. Their work is divided among subcommittees that will be exploring guidelines for honey producers and packers that will suggest the best ways to prevent foreign substances from getting into honey. This coverage will start in the field, as the honey is being produced and harvested, follow through the extracting process and storage, then end in the packaging of the final

product. That is going to take quite a bit of writing and editing, so the time line is unfixed.

When the NHB met, recently, they decided to do one more thing that may help the U.S. beekeepers even more. A request is going to be sent to our Department of Commerce to get together with their Chinese counterparts to develop a bi-lateral agreement on imports of honey from China. This would eliminate sliding tariffs, declining prices every few weeks, and many other problems with the current system. Since we have been vexing various government agencies with our complaints for quite a while, maybe this approach will appeal to them.

Bees in Space

At the 2005 WAS Conference, we heard from Bob Madsen, a devoted supporter of the Native American colleges in Montana. He has helped a number of them establish excellent science programs and he interacts with the students whenever he can. When NASA was soliciting for projects for the Reduced Gravity Student Flight Opportunities, Bob rounded up some students and the “BeeGs” were selected to fly their experiment on the “vomit comet.” That is a big jet plane that climbs up, then dives, over and over, again. On each dive, the G forces approach zero. The students and anything else not bolted down start floating around in the plane.

The experiment was to see if *Osmia lignaria* (no fear of stings, which was not the case with honey bees) could learn to fly under non-gravity conditions. For most of the experiment, the extra G forces pinned the bees, motionless, to the floor of the cage. But, late into the flight some of the bees were

crawling around pretty well, despite the added pressure. The first few weightless flights were haphazard, with a lot of wall crashing. Instead of changing bees, as planned, the same bees were left in the cage for many cycles. After gaining some experience, the bees were able to fly from one spot to another quite well in weightlessness. Turning corners seemed a little rough, but it was obvious that the *O. lignaria* had adapted to flying under zero gravity conditions. It is hard to imagine how that ability can help them on earth.

Beekeeping in Uganda

Also at the 2005 WAS Conference, Dan Mayer showed some slides and described beekeeping in the area of Uganda where he went with a group called Beekeepers for Christ. Honey is worth a lot of money in Uganda. A normal annual crop is about 3-6 pounds of cassava honey. Maximum crops can approach 20 pounds, if trees are blooming nearby. You probably have eaten the tuber of cassava – tapioca.

Previous visitors had introduced Kenya top bar hives into the area, but only about 5-10% of hives were that, or some variation of that, type. The rest were hollowed out logs, suspended from trees. On a good year, 25-50% of the hives will attract swarms. Honey is harvested from the logs in a very destructive manner. The beekeepers have no veils, suits, or gloves and they are working with African honey bees. They really take a beating!

Dan’s group re-introduced Langstroth type movable frame hives. However, it appears that “modern” hives are likely to be “oddities” for some time into the future, unless Dan’s group of trained technicians can demonstrate the value of the new design.

The reluctance of beekeepers to change management practices seems to be a world-wide phenomenon.

Beekeepers' Africanized Honey Bee Panel

At the CSBA convention, Tom Glenn, a bee breeder from the San Diego area, reported that he has been breeding bees to resist *Varroa* attack for years. Tom tested some "resistant" stocks now available. Basically, they all are hygienic in one way or another. However, hygienic behavior does not repel AHBs. Tom works his colonies in shirt sleeves, but carries full protective equipment with him in the apiaries. Colonies that appear to have been overthrown by AHBs are drenched from the top with soapy water in the evening. Tom sees a lot of small swarms about the time that the commercial bees are in almonds. He can collect those swarms and requeen them quite easily, or he just kills the swarms. Although Tom thinks that it requires about ten years for the AHBs to get totally entrenched, they have been around him only four years and he says that "the anticipation is worse than the reality."

Jim Gibbs, another beekeeper who has had AHBs around his area for five years is not having too much of a problem with them. He has killed about six colonies in five years in the Imperial Valley. He believes that the drought in southern California is a major contributing factor for the AHBs not doing better. He also sees small, off season swarms. Jim thinks that AHBs do better in near coastal regions and are not much of a problem, at all, in the "back country." Jim related that he and the Ashursts don't even try to requeen "hot" colonies. They just eliminate them.

Rex Christensen has experienced "real Africanized behavior" from some bees that have moved into his hives. He has had

enough venom "sprayed" into his face by defensive bees that his eyes burned and he was coughing. He has noted that "takeovers" occur at edges of apiaries, not in central colonies. In the fall, AHB swarms tend to "move on," especially if there is "competition" around. In order to keep AHB swarms where he can manage them, Rex stacks nuc boxes around his apiaries to catch the little swarms. Rex has convinced some natural land managers that hived bees are better than AHBs, so he has some pretty choice locations, not far from humanity.

The panel discussion generated some comments from the audience. One person reported solving the "AHBs in the hive" problem by vacuuming the bees from their boxes in the evening, after bouncing them down into a corner of the box. Those bees are believed to be coming into the Burbank area from the nearby national forest. They aren't "dark," like AHBs are supposed to be. However, the queens can be distinguished by having a yellow abdomen with stripes "all the way across." And, even though the queens are yellow, they can have black drones. Others reported on plastic bag suffocation and use of CO₂ fire extinguishers.

Drone Removal for Varroa Control

J-D. Charrière *et al.* examined the effects of removing drone brood from colonies on levels of infestation with varroa mites in Switzerland. They cut the bottom half out of a full-sized comb and let the bees build it back into drone comb, starting in March or April. When it was filled with capped drones, they cut out the drone brood and let them build and fill the combs in, again. Brood was removed four times the first year and twice the second year. A total of 3374 and 3588 cells were removed. They

found an average of 788 and 677 mites in the drone cells, respectively.

At the end of July, the untreated colonies had about 40 and 28 mites drop per day, while the colonies that had drone brood removed had drops of 11 and 4 per day. However, all the treatment did was slow down the mite population growth. All the colonies required fall mite treatments with formic acid.

The details can be found in Bee World 84(3): 117124, 2003.

Sincerely,

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