

# SELF CONTROL SYSTEM FOR THE PRODUCTION OF HIGH QUALITY HONEY: THE SWISS EXAMPLE

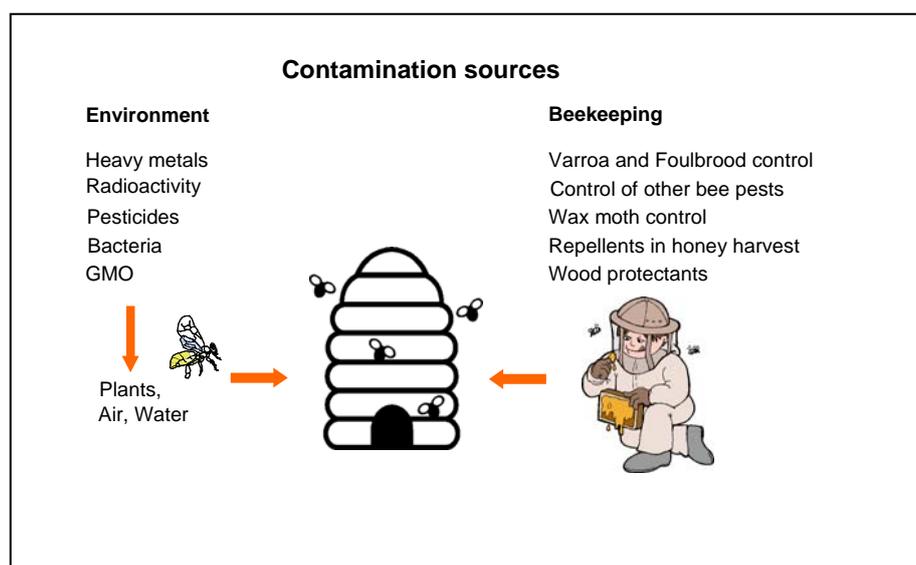
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## INTRODUCTION

According to the legislation of the European Union food has to be produced according to the principles of Good Manufacturing Practice and Good Hygiene Practice. The dangers for the contamination of food are analysed by the Hazard Analysis Critical Control Point (HACCP) based approach. While the producers of different foodstuff in the EU are enforced by law to carry out HACCP based self control, this system has not been yet applied in honey production. The reason is, that honey is a microbiologically safe product. However, in recent years the contamination risk for bee products has increased (Bogdanov et al., 2003). In Italy (Baggio et al., 1998) and Belgium (Bruneau, 2002) there are manuals for the production of quality honey have been published, based on HACCP analysis. In Germany there is a hygiene manual for the production of honey (Backer-Struss and Rieger, 2004). For practical application in beekeeping, the principles, laid down in these manuals have to be applied by a simple self control system.

This self control system has to ensure, that all factors, which influence honey quality be controlled. Contamination of honey is the major factor for the quality of honey. The contamination sources can roughly be divided into environmental and apicultural ones. The environmental sources can be further divided in agricultural and non-



agricultural ones.

GMO: genetically modified organisms

The analysis of contamination dangers have shown, that the greatest danger for the contamination of honey and the other bee products comes less from the environment, but from incorrect apicultural practice (Bogdanov et al., 2003). In table 1 the different contamination sources are enumerated. The order of enumeration in the table of contaminants and bee products corresponds roughly to the relative importance of the contaminants and the contamination risk. However, this order might vary from country to country, depending on the different apicultural practice.

**Table I.** Contaminants from beekeeping and control measures

CONTAMINANT BEE PRODUCT CONCERNED	SOURCE OF CONTAMINATION	CONTROL MEASURE
1. Antibiotics in honey	Control of bacterial diseases with antibiotics (AFB, EFB, Nosema)	Alternative control without the use of antibiotics
2. Synthetic acaricides in beeswax, propolis and honey	Varroa control with synthetic acaricides	Alternative Varroa control without synthetic acaricides
3. Pesticides in honey and beeswax	Control of wax moth with pesticides	Wax moth control by alternative measures.
4. Repellants in honey	Use of synthetic repellents at the honey harvest	Use of water or smoke
5. Synthetic fungicides in honey	Control of ascospheerosis by fungicides	Alternative measures for ascospheerosis control.
6. Heavy metals	Honey recipients	Use of recipients which do not diffuse heavy metals into honey
7. Wood protectants in honey	Pesticides from wood protectants	Use of wood protectants containing no pesticides

It is not the purpose of the present work to discuss the different control measures. Detailed concerning the different control measures are described on our homepage: [www.apis.admin.ch](http://www.apis.admin.ch).

The easiest and the most straightforward way to solve the problems connected with contamination of bee products is a self control system. It is cheap and simple and allows the successful management of beekeeping units for the production of high quality bee products. In Switzerland, a self control system was created in 2002 for the production of honey and pollen (Leuenberger et al., 2001). In the present work the Swiss self control system for the production of quality honey is presented. This system is applicable for small and medium beekeeping units, representing the great majority of Swiss beekeepers.

### THE SWISS SELF CONTROL SYSTEM

A self control system for beekeepers should be as simple as possible, but should contain all the principles, that ensure good quality of the bee products. Two forms have been created for the self control system:

Form for evaluation of dangers and possibilities for control

Form for performed self control

The self control is based on the HACCP approach. Applied to control of antibiotic residues in honey it can be formulated as follows:

<b>HACCP STEP</b>	<b>FACTOR, ACTION</b>
Hazard analysis	Antibiotic contamination of honey
Determination of critical control point	Control of American Foul Brood
Perform control measures	Avoidance of antibiotic use by correct control of AFB without the use of antibiotics
Efficient documentation	Documentation of all performed measures for the control of AFB according to Good Apicultural Practice

beekeepers, this system has Two form are handed to every beekeeper. With the help of a first form beekeepers will evaluate the dangers for the quality of the bee products so that different control measures can be planned. The control measures will be then performed by the beekeepers, ensuring the production of high quality honey. These control measures are documented by the beekeeper in a second form. This filled out form allows food control authorities to check if self control has been carried out and thus insure, that honey will conform to the requirements and will contain no forbidden drug residues.

Although this system has been created for the needs of Swiss beekeepers, it can serve as a model, which can be modified if necessary, to beekeeping practice in other countries. For application in other countries, as well as for other bee products and for larger professional to be accordingly adapted.

Form for evaluation of dangers and possibilities for control

1.1.	Danger: contamination	Importance	Control measures
Hive	a) Lack of order and hygiene, endangering quality of bee products..	medium	Re-installment of order, cleanness and hygiene.
Honey house,	b) Lack of order, cleanness and hygiene; bees present; foreign odour.	great	Re-installment of order, cleanness and hygiene.
Instruments	c) Centrifuge and recipients are improper, rusty	great	Re-installment of order, cleanness and hygiene.
	d) Instrumentation and instruments are cleaned with improper (non potable) water	great	Re-installment of order, cleanness and hygiene.
1.2.	Danger: adulteration, contamination		
Feeding of bees	a) Sugar syrup is mixed with honey.	great	Correct choice of time and quantity of sugar feeding.
	b) Use of improper water when preparing sugar feed leads to transfer of contaminants into the hive.	great	Use of drinking water.
1.3.	Danger: contamination		
Bee diseases	Treatments of bees contrary to instructions leads to intolerable residues in honey	great	Follow instructions of veterinary authorities.
1.4	Danger: contamination		
Change and storage of combs	Combs are very dark, there are moths and bee excretions, dirt, which might cause bees infection and honey contamination. Use of pesticides for wax moth control.	great	Regular control of brood- and honey combs. Optimise storage of combs. Use alternative control for wax moth control.
1.5	Danger: contamination, adulteration		
Honey harvest	a) Water content of honey > 20 %	small	Harvest honey with less than 20 % water
Packing, storage and labeling	b) In honey there are contaminants from wax, bees, dirt, extraneous substances and odours.	medium	Re-installment of order, cleanness and hygiene
	c) Improper conditions of honey storage leads to decrease of honey quality.	medium	Store honey at optimal conditions (room, recipients)
	d) overheating of honey while packing leads to reaching of too much hydroxymethylfurfural (HMF).	medium	Liquefy honey at the optimum temperature and time
1.6	Danger: contamination		
Hive	a) Contamination by the environment: (agriculture, industry) by heavy metals, pesticides etc.	medium	Identification and contamination source and its avoidance; change of hive place.
	b) Bees are intoxicated by pesticides.	small	Identification and contamination source and its avoidance.

2. Form for performed self control.....

Year 20.....

Beekeeper Address	..... .....	Place of hive (s)	.....	
	Recommendation of action	Registration of action		Date
Hive Honey house, Instruments	a) Honey house is cleaned and kept in necessary order. b) honey house, work surface, walls and instruments are clean. No chemicals in house.  Centrifuge, honey recipients and instruments are clean and rust-free. Centrifuge axis is lubricated with natural fat. Only potable water is used for cleaning.	Cleaning, tidying up: ..... ..... ..... ..... .....		..... ..... ..... ..... .....
2.2. Bee feeding	a) Bee feeding only after honey harvest. b) Sugar feeding is prepared with potable water:  Yes <input type="checkbox"/> No <input type="checkbox"/>	Feeding with: ..... .....	kg sugar per colony ..... ..... .....	..... ..... .....
2.3. Bee diseases	a) Varroa control measures after honey harvest in autumn or in winter <input type="checkbox"/> alternative acaricides <input type="checkbox"/> bio-technical measures <input type="checkbox"/>	Drugs and control measures used ..... ..... .....		..... ..... .....
	b) other diseases: AFB, EFB, Ascospheerosis, Nosema etc.	Registered diseases: .....  Drugs and control measures used ..... .....		..... ..... .....
2.4 Combs Renewal Storage	Control of wax moths without toxic drugs Comb renewal period: 3-4 years. Honey combs without impurities. Honey combs with brood are taken renewed.	Measures against wax moth: ..... ..... foundation per colony, average: brood combs:..... honey combs:.....		..... ..... ..... ..... .....
2.5 Honey Harvest Technology Storage Labeling	water content < 20 %, if possible, < 18 %. After centrifugation honey is filtered and conditioned.  Storage in tightly closed recipients made of non-corrosive metal, glass, food-compatible plastic, wooden or ceramic material.  Storage temp. < 20° C liquefying, heating temp: maximum 50-55° C for several hours or 40-50° C for 1-2 days.  Labeling: for EU product (honey), producer, packer, weight, lot Nr.	% water content: .....  filtration:.....  conditioning: .....days Storage (recipients, temperature, time:.....  time of heating: ..... temperature: .....  labeling:.....		..... ..... ..... ..... ..... ..... ..... ..... ..... .....

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