To be(e) a(t) risk

Contextualising the perceptions of increased bee mortality as a risk among Swiss farmers

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Degree of Master of Science (Two Years) in Human Ecology: Culture, Power and Sustainability
30 ECTS

CPS: International Master's Programme in Human Ecology
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Title	To be(e) a(t) risk - Contextualising the perceptions of increased bee mortality as a risk among Swiss farmers
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Examination	Master's thesis (two year)
Term	Spring Term 2016

Abstract

The phenomenon of increased bee mortality has reached wide attention and concern among Swiss farmers. This thesis analyses, from a phenomenological approach, *how* the farmers - as agricultural key actors interacting closely with honey bees - perceive increased bee mortality as a risk.

The quantitative analysis indicates that the age, the perception of the future of global agriculture and all farm specific variables - farm size, geographical zone and production method - contain a statistically significant probability to influence the intensity of the perception of increased bee mortality as a risk.

The qualitative analysis points out that the farmers perceive increased bee mortality as a complex and global risk embedded in "risk networks". According to the farmers, increased bee mortality is *a risk* with regard to pollination, harvest and nutrition. Therefore, increased bee mortality is related to the economic risk of income loss, the social risk of insecure food production and the ecological risk of an interrupted food cycle. However, simultaneously increased bee mortality is *at risk*, due to the impact of industrial agriculture and pesticides on bees. In this context, increased bee mortality is related to the political risk of the current agricultural policy, the ecological risk of pesticides and the social or cultural risk of pesticide use.

The farmers' perceptions of increased bee mortality embedded in these "risk networks" allude to the broader context of three underlying areas of tension at the intersection of culture - namely agri-*culture*, the current consumer culture and culture of *be(e)ing-in-the-world* - power and sustainability.

Acknowledgments

This is the place and time to express my gratitude to all of you who are part of my lifeworld and therefore also part of this thesis. You make my world, and therefore you mean the world to me.

In particular I thank all the inspiring farmers who contributed to this thesis. Thank you so much for sharing your knowledge and your experience with me. Thank you for giving me insight into your lifeworld.

I thank Agroscope for the permission to use their data in this thesis. I thank the whole research team of socioeconomics for the socially and academically enriching internship. I especially thank Christine Jurt Vicuña Muñoz for supporting me and for sharing your engagment and fascination for the field of anthropology, agriculture and risk. I furthermore thank Christian Ritzel and Tim Besser for your critical inputs to me delving into the world of numbers, models and statistics.

I thank Pernille Gooch for your inspiring research in the field of Human Ecology, and your dedication to the farmers. And above all, for your motivating words filled with the hope that change is possible.

I thank Camila, Elin, Joep, Sophie and Tobias for *being-in-the-castle* together. Thank you for creating a home filled with life, laughter and family.

I thank all of my friends - here and there - and fellow students and friends for the buzzing lifeworld we share. I thank Ernesto, Hanna, Julian, Kristin, Mara, Petra, Teresa and Vidar for *being-in-the-library* together. Thank you for your encouraging and endorsing inspiration to strive together for a liveable, sociable and sustainable world. Thanks for becoming - and hopefully staying - part of my lifeworld.

Last but not least, most of all I thank my parents for teaching me how to *be(e)-in-the-world*, interacting respectfully and caring with my environment - beyond people and bees. Thank you so much for supporting me to pursue my dreams in all four wind directions. Special thanks and credits go in particular to Gabriela von Atzigen for the pictures used in this thesis.

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Honey bees are very diligent animals, like ants - they are very diligent too - if you observe honey bees, if you observe them how they work, as soon as there is a bit of warmth they fly, and they have a nice product: honey. They produce honey, it is fascinating how they work and pollinate many, many flowers... Every animal... I think every animal has - a tick does not have, but even they will have a right to exist, somewhere in ecology and biology - but... but elsewhere, every animal has a right to exist... yes, only humans do not, because they destroy everything.

(Kurt H., Swiss farmer)

1 Introduction

Swiss people jokingly refer to the eastern part of Switzerland as "Mostschweiz" and to the canton Thurgau as "Mostindien", consisting of a wordplay with the words *Most* for apple/ pear juice and *Schweiz* for Switzerland, respectively *Ostindien* for East India. These playful terms, dating back to 1853, are used till today (Bretscher 2012). In this area of Switzerland fruit growing - mainly apples and pears - for juice production and consumption is a very important branch of agricultural production. Fruit growing is thus crucial in terms of agri-*culture*. It is economically valuable and socially meaningful, as the use of the words "Mostschweiz" and "Mostindien" in everyday language indicate. Therefore, fruit growing forms part of the peoples' environment as a lifeworld, created through human beings' active engagement with their surrounding (Inogld 2000: 209).

A vital part of this environment as a lifeworld are further the bee keepers and the bees[1]. However, bee colonies are currently suffering and declining globally. Also in Switzerland the bee population is decreasing, especially since 2003 (Gallmann et al. 2014; Fluri, Schenk and Frick 2004, Federal Office for Statistics (FOS) 2001). This global phenomenon is referred to as *increased bee mortality*[2].

The phenomenon of increased bee mortality is critically debated in natural science. Research focuses on the complex and interrelated biological, entomological and environmental aspects of increased bee mortality, its causes, imminent outcomes and possible solutions (Gallmann et al. 2014; Potts et al. 2010; Ghazoul 2005a; Steffan-Dewenter, Potts and Packer 2005; Ghazoul 2005b). Yet, there is a major flaw in this approach to understanding increased bee mortality: Human beings are excluded.

However, human beings' interaction with bees is very close. It goes beyond the direct engagement of human beings with bees in the form of bee keeping. Unlike with other invertebrates, insects or wild bees, the relation of human beings with bees is particularly interconnected, culturally rooted and symbolically meaningful (Fenske 2015; Lorenz 2015; Moore and Kosut 2013; Alves 2006; Crane 1999). This peculiar relation of human beings with bees needs to be taken into account when approaching the complex phenomenon of

[1] I will use the term *bees* throughout the thesis in order to refer to the western *domesticated honey bees* (apis mellifera) used in bee keeping in Switzerland (Fluri, Schenk and Frick 2004)

[2] The phenomenon of increased bee mortality includes invertebrates, insects, wild bees and domesticated honey bees. Nevertheless in this thesis I will only focus on domesticated honey bees - *bees* - when referring to increased bee mortality.

increased bee mortality and peoples' perception and understanding of it. The privileged status and culturally rooted symbolic meaning ascribed to bees need to be taken into account, because human beings are significantly entangled with the phenomenon of increased bee mortality - its causes, imminent outcomes and possible solutions (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) 2016; Lorenz and Stark 2015a; Lorenz 2015; Maibach 1961). With regard to the solutions, Fenske (2015: 64) points out that the symbolic meaning ascribed to bees might even *impede* attempts to save the bees. In the context of the phenomenon of increased bee mortality, the concern for bees has reached scientific as well as wide public and political attention and awareness throughout the world.

With this thesis[3], I aim to contribute to research on the human-nature relation in the realm of culture, power and sustainability. Furthermore, I aim to fill the research gap on increased bee mortality by including human beings. To do so I focus on the *perception* of increased bee mortality among farmers.

My focus on farmers is threefold. First, agriculture and bees respectively increased bee mortality are interrelated[4] (IPBES 2016; Potts et al. 2010; Ghazoul 2005a; Steffan-Dewenter, Potts and Packer 2005; Ghazoul 2005b; Maibach 1961). Thus, bees are an essential part of farmers' interaction with the environment as a lifeworld - not only with regard to the fruit growers as outlined above, but farmers in general. Second, due to this close link of agriculture and bees, farmers are not only key actors but need to be understood as "perceptually skilled agents" (Ingold 2000: 24). Third, a representative study among Swiss farmers conducted in 2013/2014 by Agroscope [5] on future risks in agriculture has

[3]Preliminary results of this thesis have been presented at the Annual Conference of the Swiss Society for Agricultural Economics and Rural Sociology on 31 May 2016 in Grangeneuve/Switzerland. The abstract handed in for this presentation is available online: http://archive.sse-sga.ch/Tagung16/Atzigen.pdf

[4]In this thesis, based on the farmers' perceptions of increased bee mortality, I only focus on factors that are directly linking increased bee mortality and agriculture. Nevertheless, it is important to point out that the phenomenon of increased bee mortality is very complex and includes additional influence factors - "pathogens, alien species, climate change and the interaction between them", as pointed out by Potts et al. (2005: 345). Furthermore, bee keeping practices and bee physiology are also essential influence factors (Gallmann et al. 2014).

[5]Agroscope is a Swiss research institute affiliated with the Federal Office for Agriculture (FOAG). Agroscope is in charge with research in the realm of agriculture, nutrition and the environment. One research group in the team of socioeconomics, focuses on the social dimension of agriculture in Switzerland - the living conditions and lifeworld of the farmers and their families and the social impacts of the agricultural policy and specific measures. It is in this context that this study has been conducted.

shown that increased bee mortality was rated the highest risk[6].

I approach the farmers' perceptions of increased bee mortality based on a phenomenological framework (Ingold 2000; Gooch 1998). This allows for an understanding of the farmers' "perception of the environment" as an active interaction with the environment as a lifeworld, constantly constructed over the course of the ongoing process of "being-in-the-world" (Ingold 2000: 42). In this context, the perception of risks is understood as relational (Boholm and Corvellec 2011). The perception of risks is framed by the social, cultural, political, economic and ecological context and consists of different interrelated risks forming a so called "risk network" (Jurt, Häberli and Rossier 2014: 219; van Winsen et al. 2013). This approach accounts for the fluidity and complexity of risks and risk perceptions. Understanding the perceptions of risks in "risk networks" indicates furthermore how information on a risk is interpreted and transformed into patterns of decision and action strategies (Jurt, Häberli and Rossier 2014: 219). Understanding the farmers' perceptions of increased bee mortality as a risk is thus key with regard to the implementation of possible political, agricultural and ecological measures.

Based on this, the following research questions arose for this thesis:

How do Swiss farmers perceive increased bee mortality as a risk?

Which determinants influence the intensity of the perception of increased bee mortality as a risk?

How is the perception of increased bee mortality as a risk related to other social, cultural, political, economic or ecological risks?

In order to be able to focus on the perception of increased bee mortality as a risk among Swiss farmers, it is important to shortly outline the background on increased bee mortality in Switzerland on the one hand, and the particularity of the relation between human beings and bees on the other hand.

[6]1229 Swiss farmers participated in this representative study on risk perception. The study consisted of an extensive questionnaire. The questionnaire mainly included a classification - on a scale from *very high risk* (1), *neither nor* (6) to *very high chance* (11) - of totally 48 different social, political, economic and ecological risks. These risks have been established through in depth interviews with 28 farmers and experts. Additionally, the study covered a full range of socio-demographic and farm related questions.

2 Background and Context

2.1 Honey, bees and human beings

When farmer Kurt H. (see preamble) describes bees, he expresses his fascination and admiration for them by pointing out their *diligence* on the one hand and referring to their main product, honey, on the other hand. These aspects reflect the two main approaches to understand the particularity of the relation between human beings and bees[7].

First, the symbolic approach prioritizes the meaning ascribed to bees, reflected for example in stories, poems, tales and movies (Fenske 2015: 63). According to Lorenz (2015: 13) it is through these stories that the relation between human beings and bees is filled with meaning. This symbolic meaningfulness is further expressed in the ascription of anthropomorphic characteristics to bees in everyday language use such as diligent, intelligent, well organized and social beings. This is also pointed out by Fenske (2015: 65) and highlighted by the interviewed farmers. Often this anthropomorphism refers to the social organization of a bee hive, drawing similarities to the political organization of human beings (Lorenz 2015: 13; Alves 2006: 152). Nevertheless, stressing the symbolic meaning ascribed to bees can not fully explain *why* it is attributed to bees but not to wild bees or other insects and invertebrates.

Second, from an utilitarian, opportunistic perspective, it is often argued that the particularity of the relation between human beings and bees is related to, or originates in, the use of bee products - mainly honey and bees wax (Lorenz 2015: 11; Alves 2006; Crane 1999). From this point of view, the attribution of social meaning to bees is based on the utility of bee products for human beings. This perspective on bees emphasizes either, from an anthropocentric perspective, bees' importance for human beings or, from an ecocentric

[7]The peculiar nature of the relation between human beings and bees - differing from that with invertebrates, insects or wild bees - is the focus of a recently growing and diverse research field in Anthropology. Moore and Kosut (2013) approach the relation between between human beings and bees in the context of urban bee keeping from the perspective of the emerging human-animal studies. Lorenz and Stark (2015b) also addressed urban bee keeping. They analysed the public discourses around increased bee mortality by focusing on the different actors and bee keeping practices in the context of the current bee keeping boom (ibid.). These diverse bee keeping practices, skills and knowledge - in terms of space and time - are also addressed in anthropological research (van Engeldsdorp and Meixner 2010; Crane 1999). Furthermore, Roué, Battesti, Césard and Simenel (2015) engage with the relation between human beings and bees from a cultural and ecological perspective in their "Ethnoecology of pollination and pollinators". Stressing the underlying symbolic meaning of the relation between human beings and bees, Fenske (2015) focuses on the representation of bees and the symbolism ascribed to them in media and public western European culture. This article is part of an overview over the complex relation between human beings and bees in the realm of increased bee mortality (Lorenz and Stark 2015a, Lorenz 2015 Laschweski 2015).

perspective, bees' ecosystem service. While the first places human beings at the center and externalises "nature", the latter contrarily locates "nature on the inside and humanity on the outside" (Ingold 2000: 155). Hence, from a utilitarian approach the particular and distinct relation between human beings and bees - in contrast to wild bees and other insects - can be addressed.

However, neither approach can adequately address the complexity of the relation between human beings and bees - be(e)ing "more than honey" (Imhoof 2012) - and very diverse in terms of space and time. Focusing on the interaction of human beings *with* bees as the starting point can do so - shifting from an ecocentric or anthropocentric to an *anthropocircumferential* perspective as proposed by Ingold[8] (2000: 155). With a brief and selective focus on the origin and transformation of the active interaction of human beings with honey bees, I will now exemplify this perspective.

The relation of human beings and honey bees dates back to prehistoric times as outlined in detail in Crane's (1999) 'World History of Bee Keeping and Honey Hunting'. Our ancestors presumably started interacting with honey bees around 5 Million years ago (Alves 2006: 153; Crane 1999: 35). Yet, evidence of this prehistoric interaction between human beings and honey bees does not exist until 10'000 years ago (Crane 1999: 37). Cave paintings in Europe, Africa, India and Australia dating back to that time period show bees and human beings (ibid.: 37-39). They are documents of the interaction of human beings with honey bees and the underlying knowledge, skills, practices, and material culture related to honey hunting as well as the symbolic meaning ascribed to honey bees (ibid.). Hence, one might say that the interaction between human beings and honey bees is as old as mankind itself (Crane 1999: 43; Lorenz 2015: 10).

In Europe, the relation between human beings and bees has shifted from hunting to keeping - from an interaction with wild to domesticated honey bees - over the course of history (Lorenz 2015: 10; Crane 1999). The change of interaction in the form of a process of domestication has been described as a "a social appropriation of nature" by Ingold (2000: 64). Ingold describes the process of domestication as a shift "from trust to domination" (Ingold 2000: 61-76). This process of domestication as a change of the relation between human beings and honey bees is interdependent with a shift in terms of the exploitation of honey, bees wax and other bee products. Honey, as the only sweetener in human diet

[8]This is also connected to Ingold's (2000: 76) claim to rewrite the history of human-animal relations.

and due to its basic use for mead production, was commercialized and bee keeping gained economic value, influence and privileges (Lorenz 2015: 11; Alves 2006: 154). However, trough the introduction of sugar from the sugar cane plantations in the Americas as well as sugar beet cultivation in Europe, the industrial sugar production emerged and honey, as a sweetener, was replaced (Fenske 2015: 4; van Engelsdorp and Meixner 2010: 80). Additionally, Alves (2006: 162) points out that with the growing dominance of beer, mead was replaced as the main intoxicating beverage. This shift in the use of honey also implied a decrease of the economic value of honey and bee keeping (Lorenz 2015: 12; van Engelsdorp and Meixner 2010: 80). Nevertheless, till today, honey is an important and appreciated commodity in human diet (Lorenz 2015: 12, van Engelsdorp and Meixner 2010: 80).

Recently this discourse of the relation between human beings and bees has shifted from bee products to pollination (Lorenz 2015: 12; van Engelsdorp and Meixner 2010: 80, Maibach 1961: 6). This is also reflected in the use of the term "pollinator crisis" in order to describe the overall loss of biodiversity in the realm of bees and other pollinating insects (IPBES 2016; Potts et al. 2010; Ghazoul 2005a; Steffan-Dewenter et al. 2005; Ghazoul 2005b). Bees as pollinators are "a key component of global biodiversity, providing vital ecosystem services to crops and wild plants" (Potts et al. 2010: 345). With regard to crops and agriculture, pollination is vital for human nutrition (IPBES 2016). Especially against the background of an increase of the volume of pollination dependent crop cultivation up to 300% worldwide in the past 50 years (ibid.). Thus, currently almost 75% of humans nutrition is at least partially based on pollination (ibid.). Furthermore, in this discourse, pollination is monetarised in economic terms. Gallai et al. (2009: 810) calculated that "the total economic value of pollination worldwide amounted to 153 billion Euro, which represented 9.5% of the value of the world agricultural production used for human food in 2005". The focus on pollination locates agriculture at the center of the discourse on the interaction of human beings with bees. This emphasizes the farmers to be(e) key actors, especially in the context of increased bee mortality.

In conclusion, there is a unique relation between human beings and bees. It has been established, reinforced and transformed in a process of constant construction, interaction which is located in the broader global, political, economic, social, and cultural context of the history of mankind and its twists and turns. Within this context, we need to understand the phenomenon of increased bee mortality.

2.2 Honey, bees and mortality in Switzerland

In Switzerland, bee keeping is mostly conducted as a leisure activity (Fluri, Schenk and Frick 2004; Maibach 1961: 6,8). Archive data indicate that this has also already been the case around 150 years ago, when Swiss bee keepers started to organize in order to exchange and share knowledge, standardize skills and improve bee keeping practice. This bee keeping practice has been highly influenced until nowadays by the book "The Swiss bee father" written in 1901 (Maibach 1961). In 1861 the bee keepers founded the 'Swiss bee keepers association' (Appendix D) (Maibach 1961: 9). Since then, statistical data of honey, bees and bee keepers exist, allowing for a historic overview.

In the founding years, bee keepers where mostly men. This is also reflected in the title of the most influential bee keeping handbook referring to a *father* which furthermore indicates a patronizing understanding of bee keeping. Bee keepers used to be mostly farmers (42,8%), teachers and priests (15%)(Maibach 1961). In terms of bee keepers, the bee keeping community is more diverse nowadays - including more and more women. Contrarily to back then, bee keeping nowadays is mainly conducted by non-farmers. In 2003 only 10% of the bee keepers were farmers and only 5% of the farmers were also bee keepers (Fluri, Schenk and Frick 2004: 6).

With regard to the bee colonies, Figure 1 shows that the total number of bee colonies in Switzerland was constantly changing between 1876 and 2010 (BFS 2001; Fluri, Schenk and Frick 2004). The number of bee colonies rose until 1936. This trend turned to a decrease in 1946. The decrease accelerated especially between 1986 and 1993, coinciding with the introduction of the varroa mite (varroa destructor) to Switzerland. While the colonies recovered from this - visible in the rising colony numbers between 1993 and 2001 and effective treatment methods where introduced, the issue consists till today. In addition to the threat due to the varroa mite, bee colonies are also affected by locally occurring cases of foul - and sour brood and the imminent introduction of an other parasite namely the small hive beetle. Since 2003, domesticated honey bee colonies are decreasing again.

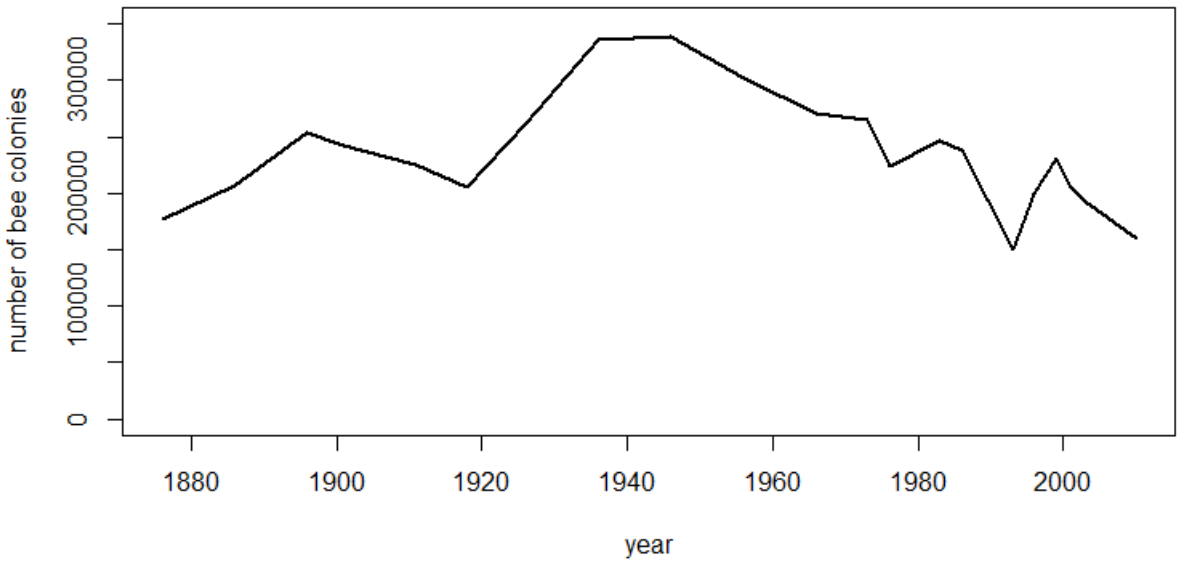

Figure 1: Domesticated honey bee colonies in Switzerland (1876-2010)

This phenomenon of decreasing bee colonies is referred to as *bee mortality*[9]. Figure 1 indicates that *bee mortality* is not a recent phenomenon, but it increased in recent years. Therefore, the phenomenon is referred to as *increased bee mortality*. In order to fully understand the phenomenon of increased bee mortality, human beings and "their involved activity, in the specific relational contexts of their practical engagement with their surroundings" need to be included (Ingold 2000: 186).

[9]In Switzerland the term 'Bienensterben' - literally translated as 'bee extinction' - is used in order to describe the current suffering and decrease of bee populations.

3 Theoretical framework

3.1 Phenomenology

This thesis is based on a phenomenological approach to understand the human-nature relation as an active interaction of human beings *with* their environment (Ingold 2000; Gooch 1998). Ingold (2000: 42) refers to this active engagement with the environment as a lifeworld as *being-in-the-world*. Ontologically speaking a lifeworld is created through the immersion and interaction of human beings with their environment (ibid.: 20). Therefore, the environment as a lifeworld is never complete, it consists of a process of constant construction (Ingold 2000: 172). In terms of epistemology, this approach focuses on the interaction, experience and "perception of the environment" (Ingold 2000). Thus, in order to know and understand a phenomenon we need to focus on how people perceive and experience it as part of their interaction with their surrounding, their *being-in-the-world*.

3.2 Risk and danger

Based on this approach, I also understand risks in the context of human beings' interaction with their environment. This interaction with the environment shifted significantly over the course of the process of modernization, a process Beck (1992) refers to as one "towards a new [reflexive] modernity". This process of modernization, framed as progress, "is being increasingly overshadowed by the production of risks" (Beck 1992: 13). That is why Beck (1992) introduced the concept of "risk society". In "risk society" "risks achieve a central importance in social and political debates" (Beck 1992: 13). These risks are increasingly produced on an unprecedented scale, they are distributed around the world crossing temporal, cultural and geographical borders (Lupton 2013: 82; Beck 1992: 13). Therefore, "it is becoming more and more difficult to identify, measure and prevent" these risks (Lupton 2005: 449). Lupton (2013: 81) points out that they are "open ended events" without a foreseeable end. Thus, these risks can not be solved or removed, only managed. This holds especially true for ecological and health related risks (Lupton 2013: 81) - like Ebola and other virus diseases, climate change or increased bee mortality. Böhm (2009: xi) emphasizes additionally that "virtually all ecological risks are anthropogenic".

Risks are selected, contested, produced, communicated and perceived in a specific temporal, spatial, social, cultural, political, economic and ecological context (Jurt, Häberli and Rossier 2014; Lupton 2013, Lupton 2005). According to this sociocultural approach, which has been highly influenced by Douglas (Douglas and Wildavsky 1982; Douglas 1992), a risk "is not a static, objective phenomenon, but is constantly constructed and negotiated as part of the network of social interaction and the formation of meaning" (Lupton 2013: 44). This understanding of risk is in line with Ingold's (2000: 218) "anthropo*circumferential*" understanding of human beings' active engagement with the environment. Thus, based on the context and the interaction with the environment, a phenomenon is identified and perceived as dangerous, as a risk (Jurt, Häberli and Rossier 2014: 219; Lupton 2013). Jurt, Häberli and Rossier (2014: 219) point out that in every day language risk is used as a synonym for danger or hazard. This is how the concept of risk is understood and applied in this thesis.

3.2.1 Risk networks

To analytically evaluate risks, Boholm and Corvellec (2011) proposed a "relational theory of risk". This theory of risk accounts "for the complex and dynamic character of culturally framed risk association [or relation] networks" (Boholm 2015: 17). A risk consists of the relation between two objects[10] - a *risk object* and an *object at risk* (Boholm 2015: 16-17). The *risk object* has the potential to harm the *object at risk* (ibid.: 16). The relation of these two objects is either based on "a hypothetical, assumed or known causal mechanism" (ibid.: 16). Boholm (2015: 16-17) emphasises that the relation between a *risk object* and an *object at risk* is dynamic and discursive. It is socially and culturally shaped and thus observer dependent (ibid.: 16). Objects can be framed "as either *risk objects* or *objects at risk*, or even as risk-irrelevant" resulting in "divergent perspectives and interpretations" of a phenomenon existing simultaneously (ibid.: 16).

This approach is a useful analytical tool for the analysis of a single risk. It acknowledges the importance of the specific context and emphasises the observer dependent perception of risks. Yet, the relational aspect in this approach is not so relational after all. For the

[10]Bohholm and Corvellec (2011: 177) refer to objects as "any kind of physical, cultural, or social artifact that can be delineated and singled out. It can be a natural phenomenon, a manufactured product [...], a cultural representation [...] or a social behaviour [...]".

reason that it only focuses on one single risk, assuming a causal linear relation between one single cause and effect - *risk object* and *object at risk* - this approach simplifies the complexity of risks. It omits the broader relational context of risks and risk perception.

Risks are perceived as interrelated. The "risk network" approach allows to take into account that risks are interrelated in multi-way links between cause and effect - multiple *risk objects* and *objects at risk* - as well as between different risks (van Winsen et al. 2013; Jurt, Häberli and Rossier 2014). According to this understanding of risk perception, risks influence, reinforce or contradict each other. This implies that the perception of one risk is related to the perception of an other risk. Thus, risk perception is a process of weighing a risk against another (Jurt, Häberli and Rossier 2014: 219). Van Winsen et al. (2013: 42) emphasise that "risk perception can be best understood as a network of interrelated notions of uncertain events, their effects and uncertain outcomes". According to this approach, the perception of risks can not be *irrational*. This is often argued under the premise that only experts, based on *facts*, know well enough to define what constitutes a "real" risk (Beck 1992: 27). One might of course argue that the farmers are in fact experts. Yet, my aim is not to assess the quality of the farmers' perceptions of increased bee mortality as a risk. Furthermore, according to the phenomenological understanding of human beings' *being-in-the-world* a separation of lay opinions from expert judgement does not account for the "perception of the environment" based on an active interaction of human beings in the world. Thus, I approach the farmers' perceptions of risks based on the premise that there is no *right* or *wrong* perception (Jurt, Häberli and Rossier 2014: 219). Risks are perceived depending on the context, they are culturally shaped by "shared conventions, expectations and cultural categories that are founded on clear social functions and responsibilities (Douglas 1985, cited in Lupton 2013: 54).

3.2.2 Risk and blame

In public discourses, risk and responsibility are inseparable. The underlying notion of ascribing responsibility to someone characterises these discourses as discourses of blame. This relation between risk, responsibility and blame has been thoroughly described by Douglas (1992) who stresses that "someone must be found to be blamed" (Douglas 1992: 16). Blame intends to link culprit and victim, perpetrator and affected. Being *at risk* "entails being placed in the role of victim, threatened by risks imposed upon oneself by

other agents" (Lupton 2013: 65). On the contrary, being *a risk* implies to assume the role of the culprit and assume responsibility for the damage imposed on the victim.

Yet, due to the complexity of risks, as pointed out by Beck (1992: 32), there is no linear causal relation between cause and effect. This implies further that there is a paucity of explicit responsibility when it comes to modern risks. Thus, there is no clear link between risk and responsibility. Especially with respect to the field of risk and agriculture, Beck (1992: 32) emphasises that "the systemic interdependence of the highly specialized agents of modernization [...] corresponds to the absence of isolable single causes and responsibilities". In the context of "risk networks" the ascription of responsibility is thus complex and blurred. Therefore, rather than ascribing responsibility, the discourses of blame express the underlying notions of power.

4 Methods

This thesis is combining quantitative and qualitative methods based on a "mixed methods approach" (Bryman 2012: 633-634, 637). This methodological approach allows for a more complete and comprehensive account of the farmers' perceptions of increased bee mortality as a risk. The "mixed methods approach" is applied under the paradigm of a complementary use of data and analysis. The two methods are connected in so far as the quantitative approach focuses on the context of the farmers and the qualitative approach on the perception of increased bee mortality as a risk. Both methodological approaches are now separately discussed in detail.

4.1 Quantitative Approach

The quantitative approach aims to statistically analyse the perception of increased bee mortality as a risk in terms of the factors influencing the *intensity* of the perception, locating it in the context of the farmers and agriculture in Switzerland.

Based on the theoretical framework, as outlined above, and existing risk research in social science, possible areas of influence have been identified for the quantitative statistical analysis. The socio-demographic and farm specific characteristics are defined as influence areas with regard to the background of the farmers. The perception of agriculture and pesticides is an area of influence due to the relation of increased bee mortality, agriculture and pesticides. Risks as a danger refer to the future. Therefore, the perception of the future, with regard to agriculture and children, is also identified as an area of influence. Furthermore, under the premise of risk as a sociocultural phenomenon, the social environment as well as social engagement and participation are summarized as the area of social embeddedness. Given the specific topic of increased bee mortality, the areas of experience with bee keeping or interaction with bee keepers and knowledge and information about bees, bee keeping and increased bee mortality are also areas of influence. And last but not least, based on the perspective of "risk networks", the influence of other risks on increased bee mortality is also defined as an area of influence. These eight areas of influence are outlined in Table 1:

Table 1: Areas of influence on the perception of increased bee mortality as a risk

Area	**Variables**
Socio-demographic characteristics	Age Sex Education
Farm specific characteristics	Production method Production branch Farm size Geographical zone
Perception of agriculture and pesticides	Agriculture and domesticated honey bees Industrialized agriculture Monoculture Pesticides and domesticated honey bees Pesticide use
Perception of the future	Future of the farm Future of agriculture in Switzerland Future of agriculture worldwide Children
Social embeddedness	Social environment Social interactions Participation in organizations
Knowledge and information	Specific "bee"- knowledge and information Origin of "bee"- knowledge and information Exchange of "bee"- knowledge and information
Experience	Experience in bee keeping Experience and interaction with bee keepers
Other risks	Environmental risks Economic risks Social risks Cultural risks Political risks

4.1.1 Data and Sample

The quantitative data used in this thesis is secondary data from the study on risk perception of Agroscope. This data set has been edited in order to be able to analyse it statistically (Appendix B).

The data set includes a sample of 765 farmers from all over Switzerland with an age ranging from 18 till 79 years. Regarding the five other socio-demographic and farm specific independent variables, production method, geographical zone, education, gender and children, included in the quantitative analysis, the sample is distributed as indicated in Table 2:

Table 2: Distribution of the independent variables

Variable	**N**	**%**
Production method		
Conventional	605	79.08
Organic	160	20.92
Geographical area		
Lowland	325	42.48
Hill	191	24.97
Mountain	249	32.55
Education		
Tertiary education	83	10.85
Professional education	571	74.64
School education	111	14.51
Gender		
Female	276	36.00
Male	489	64.00
Children		
Yes	594	77.65
No	171	22.35

The dependent variable, the intensity of the perception of increased bee mortality as a risk, is distributed over the six levels of intensity as outlined in Table 3 and Figure 3 (Appendix C). 83,4% of the farmers in the sample perceive increased bee mortality as a high risk.

Table 3: Distribution of the dependent variable

Variable	**N**	**%**
Perception of Bee mortality		
Very high risk	338	44.18
High risk	161	21.05
Rather high risk	139	18.17
Rather small risk	46	6.01
Rather no risk	28	3.66
No risk	53	6.93

4.1.2 Ordered probit regression

In order to analyse which factors influence the *intensity* of the perception of increased bee mortality as a risk, an ordered probit regression model has been calculated. Probit models allow to statistically analyse non-linear causal interrelations with regard to a dependent variable with more than two outcomes (Urban 1993: 9). An *ordered* probit regression model has been chosen due to the fact that the six outcomes of the dependent variable are ordered - ranking from 1, indicating a low risk perception in terms of intensity, to 6, indicating a high risk perception in terms of intensity.

Based on this ordered probit regression model, the influence of the independent variables on the dependent variable can be interpreted as a probability. The probability of this influence is statistically significant if the p-value is below 0.05. The influence is negative if the value of the coefficient is negative and positive if the value of the coefficient is positive.

4.1.3 Limitations

The quantitative analysis was limited mainly due to the incomplete data set in terms of missing data and missing values. Additionally some variables could not be included due

to the fact that it was too difficult to operationalize them for the quantitative analysis.

The main issue consisted of the fact that data, of some of the areas of influence as outlined in Figure 1, was missing. Therefore these areas, the perception of agriculture and pesticides, knowledge and information, and experience, could not be included in the statistical analysis.

In addition, the data set contained a lot of missing values. Yet, for the statistical analysis with an ordered probit regression, cases with complete outcomes in all variables are needed. Therefore, farmers with missing values had to be dropped from the sample. This reduced the data set from 1229 to 765 farmers.

The two areas, the social embeddedness and other risks, as well as the variable production branch could not be included because the data did not allow for an operationlisation. Thus, due to lack of explanatory significance, these variables had to be excluded from the model as well.

Furthermore, it is important to point out that the limitations are also imminent in the quantitative analysis itself. A model is only a representation of the world. It is very static and thus it can not account for the processual understanding of the environment as a lifeworld which is constantly created through the interaction of the people with the environment. However, as a complementary approach, it serves for a more complete and comprehensible understanding of the Farmers' perceptions of increased bee mortality as a risk. It is also a valuable starting point for a qualitative in-depth analysis.

4.2 Qualitative Approach

Whereas the quantitative approach focuses on the *intensity* of the farmers' perceptions of increased bee mortality as a risk with regard to the influence factors, the qualitative approach centres in-depth on the perception of increased bee mortality as a risk embedded in "risk networks".

4.2.1 Sample

The qualitative approach is based on a sample of 11 Swiss farmers (Appendix C). These farmers participated in the study on risk perception of Agroscope and agreed to be contacted in case of a follow-up study. The main selective argument was the perception of increased bee mortality as a very high risk. The farmers where further selected according to a purposive sample in order to get a maximum diversity of farmers - especially in terms of production method, production branch, age and gender.

The sample of 11 farmers consists of five women and six men. The average age is 48 years. With regard to the production method, four of 11 are organic farmers. The diversity in terms of production branch includes milk, cattle, crop cultivation, poultry, viticulture, horse husbandry, sheep farming and berry. With regard to education, two of the 11 farmers have a higher tertiary eduction, but not in farming. One participant is currently studying, thus she is not a farmer herself, but a farmer's daughter. Of the other eight farmers, five have a professional eduction, three of them have an additional farmers craftsman's certificate. The farmers are from the cantons Zürich, Thurgau, St.Gallen and Aargau. The farm size ranges from nine to 26 hectares with an average of 17.7 hectares.

Only one farmer of this sample was in direct contact with bees as a farmer, when he was cultivating canola (rapeseed). Nevertheless, the majority of the farmers do have standard apple or pear trees, mainly for juice production and personal consumption. In terms of bees and knowledge of bee keeping only one of 11 farmers has experience with bee keeping. Yet, three farmers have family members who do have bees and three others have close contact with a bee keeper who has a bee house on their farm land. One farmer especially mentioned that her husband does not keep bees but is very interested in it.

4.2.2 Data gathering

The selected farmers were interviewed based on a semi-structured guideline focusing on the following areas:

- Perception of increased bee mortality
  - Perception of causes
  - Perception of future effects and possible outcomes
  - Relation with other risks
- Perception of agriculture and increased bee mortality
  - Perception of relation between agriculture and increased bee mortality
  - Perception of relation between pesticides and increased bee mortality
  - Interaction with domesticated honey bees

4.2.3 Qualitative Content Analysis

The qualitative analysis consists of a "Qualitative Content Analysis" which aims to assess, classify, and evaluate the content (Kuckartz 2014; Mayring 2010). Based on Kuckartz (2014) and Charmaz (2006), this evaluative content analysis consists of four different phases. These phases are not clearly separated from each other but rather understood as a interdependent, overlapping process of going back and forth between data and analysis.

Five interviews were fully detailed transcribed, six interviews were accurately summarized. The transcribed interviews were initially coded with RQDA in order to define categories based on the theoretical framework and key concepts, as outlined above (Bryman 2012: 569, Kuckartz 2014; Larcher 2010). Then, all the interviews where selectively coded. Bryman (2012: 568) stresses that coding is a process of reviewing "parts of the data if it seems of potential theoretical significance and or to be particularly salient within the social worlds of those being studied". Coding, according to Charmaz (2006) "is more than managing data, it is [a process of] organizing, label, separate, compile".

Additionally corresponding characteristics were ascribed to the coded passages. The following five characteristics have been identified in order to evaluate the perception of increased bee mortality and other risks:

- Social: A risk which is related to "interpersonal relations" (Ingold 2000: 172)
- Cultural: A risk which is related to the underlying value system
- Political: A risk which is related to political power
- Ecological: A risk which is related to the "inter-organismic relations" (Ingold 2000: 172)
- Economic: A risk which is of financial order related to money and income

In a profile matrix schema the different evaluations were complied, compared and evaluated in order to present the data.

4.2.4 Limitations

Limitations with regard to the qualitative analysis include the fact that the study on risk perception of Agroscope was conducted in 2013/2014, two years ago. When I contacted them, some farmers actually did not remember having taken part in the study.

Furthermore, some farmers pointed out that the result of the quantitative analysis depends to a great extent on the popular movie "More than honey" (Imhoof 2012). This is a very interesting point, as there might be indeed a link between the movie raising public awareness and the farmers' perceptions of increased bee mortality as a risk. Nevertheless, to explore more detailed on the complex interrelatedness of media coverage, communication and perception of increased bee mortality as a risk would go beyond the scope of this thesis. Yet, the phenomenon of increased bee mortality is an interesting case for more research in the field of media, communication, politics and risk perception.

"Qualitative Content Analysis" is a very time intense research method. This resulted eventually in a restriction of the sample to be included in this thesis. Originally I aimed to include the different key actors - farmers from the study, additional farmers (especially fruit growers), bee keepers, politicians and environmental organisations - in order to embed farmers' perceptions of increased bee mortality as a risk in the broader context. Yet, I

limited the focus only on the farmers from the previous risk perception study. This of course implies that some context in the broader sense is lost. Nevertheless, it allows to link quantitative and qualitative data closer. It also allowed for more in-depth analysis of the farmers' perceptions of increased bee mortality as a risk.

Criticism of "Qualitative Content Analysis" and coding is often referring to the loss of content through labelling (Bryman 2012: 578). However, I would argue that it is not a loss of content, but closely connected to the researcher being in the field.

4.3 Be(e)ing-in-the-field

Understanding human beings interaction and engagement with the surrounding as *being-in-the-world* also includes science and *being-a-scientist*. Thus, science is based on the constant interaction and engagement of the scientist with the informants and the data. The scientist is an active part of the research process as a whole - including data gathering, data management and data analysis. This also goes for my engagement with the field.

I first engaged with risk and risk perception during my internship at Agroscope. From there, my interest in the phenomenon of increased bee mortality as well as its' perceptions as a risk among Swiss farmers started to merge and grow into the topic of this thesis. My interest shaped my approach to the field and my experience of *being-in-the-field*. I was interested in the topic because of the two main actors - bees and farmers.

Even though I am not a farmer myself - I do feel a sense of connection to them through me growing up in a rural environment actively engaging with farmers in different ways. This is of course not the least due to the fact that everything I eat is produced by farmers. This interest and sensitisation for farmers goes also for bees. I am used to the smell and taste of honey from freshly cut honeycombs, when my mum would extract honey in summer. I am used to the smell of melting bees wax when I helped her preparing additional honeycombs for the bee hives. I am used to the smell of the pipe she sometimes used, in order to calm down the bees, when she was working in the bee house. I learned to stay calm when the bees buzz, whiz and fly around my head. I also learned to be careful when walking barefoot through the garden in order to avoid being stung by a bee. Yet, I did not interact with the bees directly as a bee keeper myself - so far. Nevertheless, I engaged with bees as part of my surrounding, as *being-in-the-world*. I engaged with bees as part of my own personal lifeworld, as part of our garden:

Thus, *being-in-the-field* - at the intersection of bees and agriculture - is not only shaped by my interest, but also a certain familiarity and deep respect. This facilitated my approach not only to the topic but also to the farmers. Besides my personal engagement and interest for bees and farmers, the access to the field was also facilitated through my internship at Agroscope. Being able to contact the farmers through Agroscope gave me - and this study - a sort of credibility and seriousness. Yet, my role as an internee was still a bit different, being not fully, but just enough, part of Agroscope. On the one hand this resulted in an advantage, as the farmers felt committed to take part in the study and contribute to something they can relate to - due to the relation to the known agricultural research institute of Agroscope. On the other hand it also implied a constraint.

Being a representative from Agroscope included that I was one of *them*, referring to those from *up there* in Bern - the capital of Switzerland and the political center of the Swiss government. This indicates that the farmers perceive *them*, the bureaucratic officials, as being hierarchically higher stated in terms of status, but lacking of practical and useful applicable knowledge in agriculture. To some extent I had to accept this as my role - a role I critically reflected throughout my research process, my engagement with the farmers and the process of data analysis.

Furthermore, I did not go there to tell the farmers what to do (better), as officials usually do when they come to the farmers from *up there*. I did ask them what they think. I listened to their opinions being honestly interested in their lifeworld and engagement with their surrounding, their *being-in-the-world* - under the premise that they are "practically skilled agents". I respected them for their experience and knowledge. And over the process of engaging with the farmers I had the impression, that they are not used to being approached like this. From my point of view, they appreciated it and interacted interested and openly with me. Thus, I do consider my role as a scientist also as one of giving a voice to those - unfortunately often unheard - farmers, because they do have a lot to tell.

5 Findings and Analysis

5.1 The place to be(e)

The ordered probit regression model in Table 4 indicates which factors have a statistically significant probability to influence the dependent variable, the intensity of the perception of increased bee mortality as a risk.

Table 4: Ordered probit regression model

Variable	**Coefficient**		**Std. Error**
Age	-0.0079	*	0.0039
Sex	-0.1574		0.0858
Education	-0.0917		0.0813
Children	0.1126		0.1113
Geographical zone (Mountain - Hill)	-0.3211	**	0.1106
Geographical zone (Mountain - Lowland)	-0.1599		0.1006
Farm Size (ha)	-0.0089	***	0.0025
Production method	0.2736	*	0.1068
Perception of future (Farm)	0.0799		0.0596
Perception of future (Agriculture in Switzerland)	-0.0028		0.0682
Perception of future (Agriculture worldwide)	0.1785	**	0.0608
		Pseudo R^2	0.0297
		N	765
		*	p 0.05 - 0.01
		**	p 0.01 - 0.001
		***	p < 0.001

The model shows that of the included socio-demographic variables only the variable age has a low statistically significant probability of influencing the dependent variable. Thus, the younger farmers are, the higher is the intensity of their perception of increased bee mortality as a risk. This might indicate that younger farmers are increasingly sensitized for environmental issues, for example due to education at school or as part of their professional education to become a farmer. Contrary to other studies in social science risk research, the

probability of an effect of the variables gender, education and children on the dependent variable is not significant.

With regard to the farm specific variables, the model indicates that they all contain a statistically significant probability to influence the dependent variable. The variable geographical zone has been included into the model comparing mountain to hill zone on the one hand and mountain to lowland zone in order to have a more accurate explanatory significance with regard to which zone influences the dependent variable. When comparing farmers from the mountain and lowland region there is no significant effect. The geographical zone is only significant when comparing mountain and hill zone. Thus, farmers living in the mountain area perceive increased bee mortality as a higher risk than farmers from the hill area. The influence of the geographical zone might be connected to the production branch, as the geographical zone influences the production branch due to climate and other conditions. Yet, as the variable production branch is not included in the model it is difficult to confirm this or explain how exactly they are correlated. The strongest statistical significant with regard to the probability of influencing the dependent variable has the farm size. The bigger a farm is in terms of cultivated hectares, the lower is the intensity of the farmers' perception of increased bee mortality as a risk. This points towards the question if and how farm size and environmental awareness in general are connected. The model indicates that with regard to the phenomenon of increased bee mortality this is the case. However, to confirm the argument that increasing farm sizes result in a declining environmental awareness - and what this implies for agri-*culture*, the environment and the interaction with it - more research would be needed. Nevertheless it is a relevant issue, especially in the context of the overall trend of increasing the farm sizes in Switzerland. Production method also has an impact insofar as the probability of the effect on the dependent variable is of low statistical significance. This indicates that organic farmers perceive increased bee mortality as a higher risk than conventional farmers.

The perception of the future relates the perception of increased bee mortality to the general perception of the future. As already pointed out above the variable children is not significant. In the model three different variables are included to account for the perception of the future - the future of the farm, the future of agriculture in Switzerland and the future of agriculture worldwide. Only the perception of the future of global agriculture has a probability of a statistically significant positive impact on the dependent variable. This implies that farmers perceiving global agriculture pessimistic also perceive increased bee mortality as a higher risk. The contrasting perception of local and global agriculture might

indicate that the farmers do trust more in Swiss agriculture than in global agriculture. Or that they, especially with regard to a global phenomenon like increased bee mortality, think globally.

5.2 To be(e) or not to be(e)

As pointed out by the quantitative data, the farmers[11] perceive increased bee mortality as a complex and global risk. The complexity, the unprecedented scale and the uncertainty, with regard to the causes or possible outcomes of increased bee mortality, are of great concern to the farmers.

The perceptions of increased bee mortality as a risk are shaped by the close interaction of farmers as agricultural key actors in terms of "perceptually skilled agents" and bees as part of their lifeworld:

> One has to have honey bees, because I have 100 standard trees ... apple and pear trees, in an exemplary manner I would say ... These trees have been promoted [as part of the ecological compensation program][12] and are [financially] subsidized, because trees are part of the landscape and of nature... we need to have honey bees for nature.
> (Kurt H.)

In this context of a lifeworld, where farmers engage with bees as an important part of their surrounding, for the farmers increased bee mortality is more than just bees dying.

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[11] From now on with "the farmers" I refer to the interviewed farmers included in the qualitative analysis of this thesis (Appendix C).

[12] Most of the interviewed farmers plant standard trees in order to grow apples - mostly for juice for self consumption. This is incited by the agricultural policy including ecological compensation and biodiversity measurements. Swiss farmers need to fulfil a certain amount of ecological compensation and biodiversity measures in order to be eligible for direct payments. Planting standard trees is thus financially subsidised as a compensation measure in the context of increasing biodiversity and greening agriculture. Additionally, specific measures are required in order to produce for a certain production label (Bio Suisse, Demeter, IP).

5.2.1 To be a risk

The farmers perceive increased bee mortality as *a risk*, mainly with regard to the "'pollination crisis". Therefore, the perceptions of increased bee mortality as *a risk* are embedded in the current discourse on the relation of human beings with bees focusing on bees' pollination service. Agriculture, especially pollination dependent agriculture like apple production in the eastern part of Switzerland, is *at risk* by increased bee mortality.

With regard to the "pollination crisis", the farmers link increased bee mortality to harvest. As most of the farmers keep standard fruit trees as an ecological compensation measure besides their main production branch, they are directly connected to pollination, bees and harvest. In the context of the "pollination crisis", harvest is *at risk* by increased bee mortality. For the farmers themselves, depending economically on their harvest, this implies that their income is *at risk*. Therefore, increased bee mortality is related to the economic risk of income loss. The relation between "pollination crisis" and economic risk is further illustrated as a few farmers point out that the costs of pollinating by hand[13] would be too expensive.

According to the farmers' perceptions of increased bee mortality as *a risk*, the "pollination crisis" is also linked to nutrition and food *in*security. Thus, nutrition and food security are perceived as being *at risk*. This relation of increased bee mortality and nutrition has also been highly emphasized by the IPBES (2016). Human beings depend fully on their surrounding when it comes to nutrition as the basis for their survival. Therefore, increased bee mortality is related to the ecological risk of an interrupted food cycle.

Yet, food is eventually produced by the farmers. Farmers produce food for society, food for the people, food for the consumers. They are located at the intersection of harvest and nutrition. The food production is *at risk*. Thus, for the farmers increased bee mortality is related to the social risk of insecure food production. Because, in the context of the "pollination crisis" the farmers can not produce food for society any more, they could not fulfil their social function any more.

To sum up, according to the farmers, increased bee mortality is *a risk* for agriculture insofar as the "pollination crisis" affects pollination dependent agriculture. In this context,

[13]Here the farmers refer to the movie "More than honey" (Imhoof 2012). In one scene, the movie portrays a Chinese village where people, due to lack of bees, pollinate by hand.

increased bee mortality is linked to the economic risk of income loss, the ecological risk of an interrupted food cycle and the social risk of an insecure food production. These social, economic and ecological risks related to increased bee mortality are interrelated and overlap each other. Depending on their individual lifeworld, the farmers emphasize one aspect over the other. Nevertheless, it is important to emphasize that it is not possible to separate these risks. They are related in a manifold interplay, shaping the individual perception of increased bee mortality as a complex risk.

The perceptions of increased bee mortality as a risk are complex. Because, the farmers perceive increased bee mortality as *a risk* as well as *at risk*.

5.2.2 To be at risk

With regard to increased bee mortality being *at risk*, the farmers mainly refer to industrial agriculture and pesticides.

Farmer Charlotte K. points out that increased bee mortality is *at risk* due to industrial agriculture, referring mainly to the agricultural policy and the system of direct payments. According to this farmer, the current agricultural policy of Switzerland constitutes *a risk*, because, despite the fact that the farmers care about their environment due to their active engagement of *being-in-the-world*, it leads to a behaviour of work to rule actions and resignation among farmers. In this context, due to an increasing amount of regulations based on financial incentives, ecological measures become political and financial. Thus, increased bee mortality is related to the political risk of agricultural policy.

With regard to pesticides as *a risk*, the farmers differentiate between pesticides in general and the *use* of pesticides. The farmers relate pesticides in general to the broader context of the interaction of human beings with their surrounding, referring to the negative impact of pesticides on bees, the environment in general and human beings' health. Thus, increased bee mortality is related to pesticides as an ecological risk. However, pesticides are *used* based on an underlying value system shaping this interaction of human beings with their environment. This human-nature relation is perceived as critical and destructive, as pointed out by Farmer Kurt H. who states that "human beings destroy everything". Therefore, increased bee mortality is related to the *use* of pesticides as a cultural risk. Surprisingly organic as well as conventional farmers are critical towards pesticides. Conventional farmers are more critical towards pesticides than often assumed. Nevertheless, they emphasize that increased bee mortality is related to the *use* of pesticides as social

risk. For them, the *use* of pesticides is a social risk, because it is based on consumption patterns and the farmers' social function to produce food for the consumers.

To sum up, increased bee mortality is *at risk* by industrial agriculture and pesticides. According to the farmers, increased bee mortality is related to the political risk of agricultural policy reinforcing industrial agri-*culture*, the ecological risk of pesticides in general and the cultural or social risk of pesticide *use* related to the underlying value system respectively the current consumer patterns. Thus, increased bee mortality is not only *a risk* but also *at risk*. However also with regard to agriculture the farmers perceive it as *a risk* as well as *at risk*. Therefore, we need to address the perceptions of increased bee mortality as a risk as embedded in "risk networks".

5.2.3 Increased bee mortality as risk networks

The farmers' perceptions of increased bee mortality as a risk indicate that the relation between *risk object* and *object at risk* consists of overlapping and interdependent multiway links. Hence, a separation as Boholm (2015) suggests is not possible in the case of the farmers' perceptions of increased bee mortality as a risk related to other social, cultural, political, economic and ecological risks. Boholm (2015: 16) points out that a risk can be *risk object* and *object at risk* at the same time, as the perception of a risk is observer dependent. However, whereas Boholm (ibid.) refers to different observers, the farmers' perceptions of increased bee mortality as a risk point out that an object can be simultaneously both - *risk object* and *object at risk* - for the same observer. According to the farmers, several risks - increased bee mortality, agriculture, pesticides - in the "risk networks" of increased bee mortality are simultaneously perceived as *at risk* as well as *a risk*. It can be both because these risks are not perceived individually as a causal linear relation between cause and effect, between *risk object* and *object at risk*, but rather as embedded in a complex "risk network". This complex interplay of different risks forming a "risk network" is in line with the understanding of an *anthropocircumferential* perspective on the interaction of human beings with the environment, *being-in-the-world*, as a constant process of constructing a lifeworld.

Figure 2 outlines this simultaneous perceptions of increased bee mortality as *at risk* as well as *a risk* in relation to agriculture schematically. This scheme does not account for the interdependent and complex character of the risks and the complex and manifold relations linking them. Additionally it is important to mention that with the focus on the relation between increased bee mortality and agriculture other risks are omitted, to account for them they are included in the scheme with arrows.

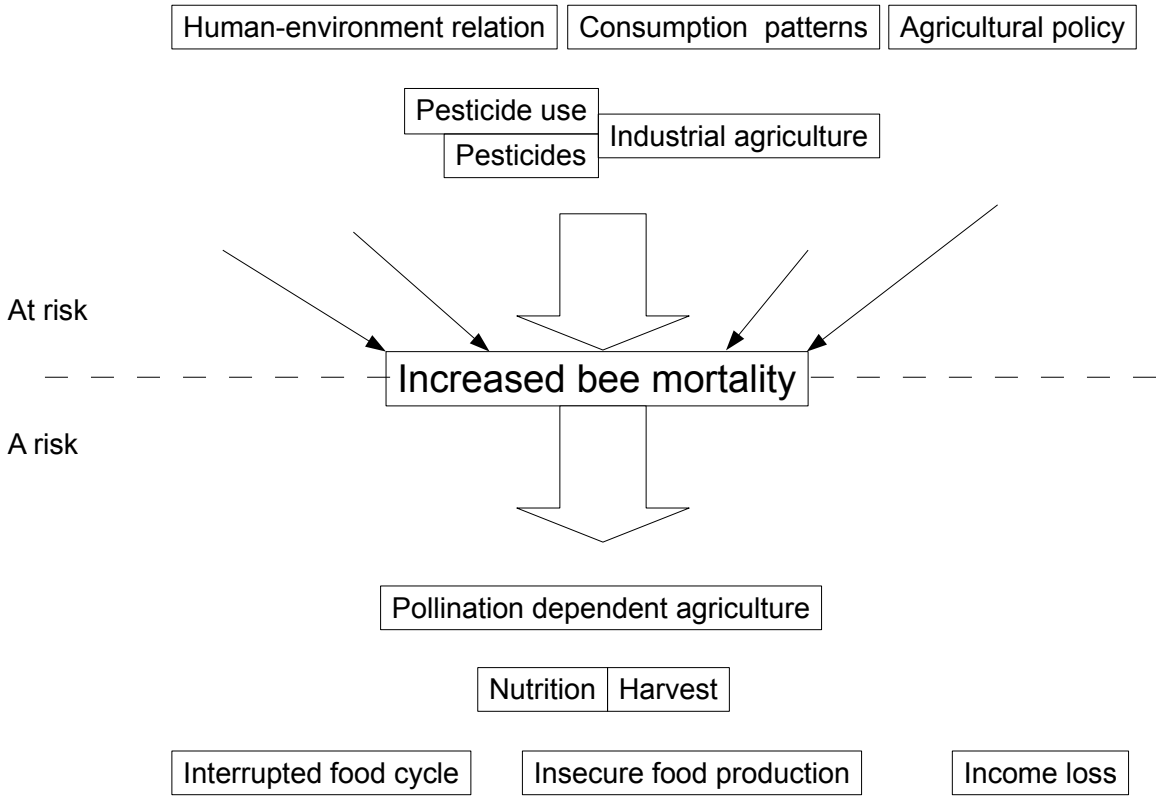

Figure 2: Increased bee mortality: *at risk* and *a risk*

For the farmers, as agricultural key actors, being simultaneously *at risk* by increased bee mortality as well as *a risk* for increased bee mortality results in a dilemma, especially with regard to the use of pesticides. A farmer describes the dilemma he is facing as follows:

> I mean they [pesticides, insecticides] are strong, I have to acknowledge that. If you go through with it then everything is dead... *Ende Feuer*... finished... and you have ... mentally, this made me think, yes ... and I understand opponents of pesticides, those who say "this is not good". But, on the other hand, if we can not use these pesticides against pests... then we are left with nothing, then we do not have any harvest any more. That is the balancing act we need to do. (Thomas B.)

On the one hand, Thomas B. acknowledges that pesticides are *a risk*, referring to the negative impact on the environment. Yet, on the other hand he points out that harvest is constantly *at risk* and pesticides are needed to secure it. Pesticides are needed in the current social, cultural, political, economic and ecological context of agri-*culture*. A similar thought has been expressed by Beck (1992: 32) referring to the farmers' need to "practice fertilizer-intensive overproduction in order to survive" (Beck 1992: 32). Furthermore, due to the lack of alternatives, banning pesticides is perceived as *a risk* by most farmers. Especially conventional farmers point out that it would imply to be *at risk* with regard to insecure harvest. Additionally, Thomas B. emphasizes that "pesticides are relatively cheap... the price-performance ratio is outstanding". He stresses the importance of pesticides by saying:

> If you want a full harvest you need to go *full power*, you know, and if you go *full power* you also need to apply pesticides *full power* ... and I used to be a "full-power-farmer". The only thing that counted was efficiency and productivity, earning money, producing every year faster and more, if possible, producing more in the same period of time. [If we apply pesticides] we [farmers] have absolute security. If you apply the pesticides you know you can sleep well. (Thomas B).

Thus, pesticides are needed because the short-term economic benefits predominate the long-term ecological harms. This points out that the farmers are not only *at risk* by "nature", but also by agri-*culture* itself. And therefore, paradoxically, agri-*culture* becomes

a risk in order to avoid being *at risk*. Agri-*culture* becomes *a risk* to agriculture. Agri-*culture* becomes a risk to itself.

Concluding, increased bee mortality is perceived as a global and very complex risk related to other social, cultural, political, economic and ecological risks forming "risk networks". Different farmers weigh different risks higher, but for all of them they are inseparably interrelated. These risks are not only interrelated, they sometimes contradict each other and result in dilemmas for the farmers. This needs to be taken into account, especially when thinking of and implementing ecological measures for bees.

5.3 Let it be(e)

One way to improve the natural habitat of bees - also of wild bees - is the idea of a so called "bee pasture" (Gallmann et al. 2014). This bee pasture aims to improve biodiversity and the food supply for bees in terms of quality, diversification and continuity. The idea of this project is that farmers, as part of their ecological compensation measures, reserve a certain part of their cultivated area to plant a special seed mixture with flowers for bees (Gallmann et al. 2014).

The idea of a bee pasture is not approved by the farmers. But there are different reasons for it, depending on the perception of increased bee mortality as a risk related to other social, cultural, political, economic and ecological risks forming a "risk network".

Most farmers emphasize in their perception of increased bee mortality as a risk the aspect of pesticides or pesticide use as a risk for bees. Monoculture is only marginally mentioned by a few farmers. Thus, the idea of a bee pasture focusing on this aspect does not target the main causes of the phenomenon as perceived by the farmers. Therefore, it lacks the support of the farmers with regard to the effectiveness and impact of this measure.

Furthermore, for the farmers who emphasize the relation between human beings and the environment in general as an ecological or cultural risk for the environment, the bees and human beings themselves, the idea of a bee pasture does not go far enough. According to these farmers a bee pasture does not improve the natural habitat for bees. With a bee pasture there is no significant increase in biodiversity. For them the problem lies deeper, because, as stressed by Charlotte K. "there is not enough nature any more". Also for Lorena M. a bee pasture does not tackle the basis but is a political measure called "Pflästerlipolitik" - literally translated as "band-aid-politics" - in everyday language use.

This Swiss German term refers to policies that do not aim to target the cause but to fix the caused symptoms. Besides the perception of the bee pasture not tackling the main issue and its doubtful ecologically significance and impact, this alludes also to a third reservation of the farmers towards the project.

Some farmers emphasize the political risk - with regard to the current agricultural policy - related to increased bee mortality. In this context, a solution that is part of the agricultural policy they perceive as a risk lacks important support. Furthermore, the farmers' approval is bought through financial compensation for implementing specific measures. These political incentives, regulations in combination with financial compensation raise the question of the sustainability of such measures. If the policy changes, the subsidies are reduced or cut, the farmers would not plant a bee pasture any more. Farmer Thomas B. affirmed this on the ground of the farmers' need to earn money. Farmers earn money through the cultivation of their land. In order to make an idea like a bee pasture attractive for the farmers, the financial compensation would need to be at least the same or higher than what could be earned through cultivation. Yet, this poses a new dilemma, namely that the farmers might actually earn more for planting a bee pasture than for producing milk. This is a dilemma for some farmers, because their identity as a farmer is to produce food. And in the broader context it might also be a dilemma for society as a whole with regard to food security and food sustainability.

Additionally, for some farmers the idea of a bee pasture is critical because their farm land is scarce. And thus, reserving a certain amount of their land for ecological compensation, reduces the land available for cultivation. For these farmers the bee pasture constitutes an additional risk. It is a risk for them because it implies that they can produce less, as less land is available for cultivation. Or that on the remaining farm land they need to increase productivity and intensity of cultivation.

The idea of a bee pasture is a perfect example to outline the complexity of increased bee mortality and its perceptions as a risk embedded in risk networks with regard to possible solutions. In the broader social, cultural, political, economic and ecological context a solution to a problem suddenly turns into a problem or risk itself. Thus, the idea of a bee pasture also alludes to the complicated question of risk and responsibilities.

5.4 Bees, buzz and blame

Increased bee mortality is perceived as being linked to other social, cultural, political, economic and ecological risks forming complex "risk networks". These "risk networks" also point to the "systemic interdependence of the highly specialized agents" engaging with each other in this specific context (Beck 1992: 32). Thus, increased bee mortality is neither isolable in terms of a single cause nor with regard to the ascription of clear responsibility to a single actor. And yet, despite the complexity of the phenomenon in terms of cause and responsibility, someone has to be blamed (Douglas 1992: 16). Indeed, someone is blamed for increased bee mortality, namely the farmers.

Due to the focus on agriculture and pollination, the public discourse on increased bee mortality centres on the farmers - not only as key actors but as main culprits. In the public discourse it is the farmers who are blamed and burdened with guilt and responsibility for causing increased bee mortality. But, what are the underlying notions of power of this ascription of responsibility to the farmers through blaming them? Are the farmers culprits or inculpated victims? And how do the farmers perceive being blamed and react to it?

For the farmers the ascribed responsibility for causing increased bee mortality through the public discourses of blame implies to be burdened with guilt. This is a great and manifold concern to all of the interviewed farmers. Because:

> then we [the farmers] stand there ... again ... as the poisoners of the world, the national poisoners. And the farmers are already at the margin of society, on the edge of survival, and, you know, we need to be careful, to not be forced further into this corner... This is also not good for the image of the farmers.
> (Thomas B.)

With this, the farmer Thomas B., among others, points out that the farmers are easy to blam. They are "merely the weakest link in the chain of destructive cycles" (Beck 1992: 32). According to the interviewed farmers they lack capacity and power and are therefore an easy target to blame, inculpate and victimize.

Thus, farmers blame their blamers for their discourse of "blame". According to the farmers, the blamers focus on agriculture as a clear cut and isolable cause. Agriculture is turned into a scapegoat and the farmers as the key actors are the culprits. The farmers

point out that this discourse of blame omits the impossibility to single out and ascribe clear-cut responsibility. They blame the blamers for oversimplifying the complexities of the phenomenon of increased bee mortality with regard to the causes and responsibilities.

However, the farmers are not only blamed, they are also blamers. The range of those who are blamed by the farmers is broad and often overlapping as the farmers blame multiple "others". Whom the farmers blame is closely related to their individual perception of increased bee mortality as a risk related to other social, cultural, political, economic and ecological risks. According to this there are three main areas of blame, namely agricultural policy, globalisation, and most of all current consumption patterns.

Farmers weighing the ecological or cultural risks related to increased bee mortality high tend to blame humanity as a whole due to its relation with the environment. According to the farmers this relation is critically shaped and reinforced by the underlying value system. To exemplify the critical aspect of the relation of human beings with the environment the farmers refer to globalization. They point towards the downsides of globalisation, for example that the import and export of goods also includes import of pests and parasites, like the varroa mite, as new risks for agriculture.

Farmers weighing the political risks related to increased bee mortality high tend to blame the agricultural policy or the system of direct payments. In the context of the general agricultural policy of Switzerland they emphasize the power structures which, according to them, both regulate and restrict their economic and ecological actions and practices.

Interestingly, all the farmers, blame the consumers. They blame the consumers with regard to the use of pesticides as *a risk* for increased bee mortality. Based on this discourse of blaming the consumers three interdependent aspects of handling responsibility can be depicted - namely externalisation, legitimisation and relativisation of responsibility.

First, while all the farmers acknowledge the negative impact of pesticides on bees, they refuse and externalize responsibility for its use by blaming the consumers. According to some farmers the consumers are responsible, because "the consumers decide what grows on the fields... with what is on their tables" (Kurt H.). The farmers blame the consumers as an externalized "other". Nevertheless this externalisation of responsibility has a flaw, as eventually the farmers themselves are also consumers. Furthermore, the farmers refer to "the consumers" as a generalised and homogeneous group. Yet, who are "the consumers"? There is no such homogeneous group of "consumers", as well as there is no such homogeneous group of "farmers".

Second, the farmers legitimize the use of pesticides with the expectations of the consumers, referring especially to price and quality. The farmers link the expectations of the consumers to their "thinking" stating that "the thinking of the consumers is wrong" (Charlotte K.). With their uniform blame of the consumers - their expectations, their thinking and their consumption patterns - the farmers legitimize the use of pesticides with regard to the current consumer culture. According to the farmers the expectations of the consumers can only be met with the use of pesticides. However, only a few farmers raised the question if it is in fact the consumers who shape the current consumer culture or rather the supermarkets and retailers.

Third, the farmers relativize the responsibility with regard to pesticide use by comparing the local agri-*culture* of Switzerland with the embodiment of industrialized agri-*business* in the USA, Canada or Argentina. They point out that the small scale agricultural system constituting the Swiss agriculture based on family farming is not as harmful for bees as the industrial and pesticide intensive large scale monoculture based agri-business of global agriculture[14]. The farmers relativize the responsibility of Swiss agriculture by blaming global industrial agriculture to be worse. By doing so, they omit that, besides the fact that agriculture in Switzerland is organized on small scale, it is still industrialized and intensive agriculture and that there is a trend towards agri-*business*.

Concluding from these discourses of blame that the farmers are either the culprits or the inculpated victims does not take into account the complexity of the unclear and multiple causes and responsibilities of increased bee mortality as a modern risk. With regard to increased bee mortality and pesticides, the question of responsibility is evidently focusing on the farmers as main culprits. But is it justifiable to blame the farmers? Farmers are agricultural key actors and what is obvious from their perceptions of increased bee mortality as a risk is that they are sensitized for the phenomenon. The farmers are also sensitized for the causes of increased bee mortality related to agriculture. Nevertheless, farmers are bound to the social, cultural, political, economic and ecological context in which they interact with the environment as a lifeworld. This lifeworld is very complex and often conflicting as it does not only refer to the relation of the farmers with "nature" but also with people and society as a whole. Thus, is it justifiable to blame the farmers because it is them who apply the pesticides? Yet, if not the farmers, then who is responsible

[14]The farmers especially refer to the vast almond plantations in the USA. Another scene of the movie "More than honey" (Imhoof 2012).

for pesticides its use and its relation to increased bee mortality? Is it the agrochemical companies producing them, the government allowing them, the wholesalers demanding them - with regard to price and quality - and the consumers tolerating them? Or is it all of those actors together interacting interdependently in this specific social, cultural, political, economic and ecological context of a shared lifeworld? Can there be a collective responsibility? Regardless of the question of responsibility, what is sure is that human beings will all pay the price for it, also for only "let it happen". The farmers are at least aware of it and they are sensitized to do something. Yet, it is more complicated than just do something about increased bee mortality.

6 Discussion

6.1 Be(e)ing-in-the-world

The farmers perceive increased bee mortality as a risk related to other social, cultural, political, economic and ecological risks forming complex "risk networks". The complexity and interrelatedness of these risks indicate that there is more at stake than bees. Increased bee mortality is often referred to as an indicator for an unbalanced ecosystem. The perceptions of increased bee mortality as a risk, then, serve as an indicator for the relation of human beings with their environment. This relation is perceived as critical for bees, the environment and human beings. Therefore, the farmers' perceptions of increased bee mortality as a risk alludes to three main underlying areas of tension, closely linked to the interrelated notions of culture, power and sustainability:

- Production and consumption are worlds apart
- Agriculture is caught between concurrent and conflicting processes of intensification and greening
- Human beings are a risk for themselves

6.1.1 Producing for consumers?

Farmers are producers. Being a producer is how the farmers identify themselves. It is how they define and perceive their social function. The farmers produce food for society as a whole. They produce food for the consumers. However, according to the farmers this relation between themselves as producers and the consumers is disrupted. How disrupted it is, is outlined by the farmers' perceptions of increased bee mortality as related to the social risk of the current consumer patterns wit regard to the consumers expectations. These expectations - especially in terms of quality and price - of the consumers are conflicting and contrasting with regard to the produced products and the reality of their production. All farmers point out that these expectations do not meet the effort and input they need to produce them. These expectations are also not in accordance with the long-term impact of the production on the environment as a lifeworld. Thus, the perceptions of increased bee mortality as a risk among the farmers alludes to an area of tension between production

and consumption. It is an area of tension centring on cultivation - the cultivation of the land for food production and the contradicting and conflicting cultivation of the current consumer culture.

The current consumer culture in Switzerland, focusing on the economic costs, ignores the social, cultural, political and ecological costs of production. Therefore, currently the consumers do not pay the whole price when buying a product. Increased bee mortality then can be understood as the price the consumers don't pay when buying a product. They don't pay it in monetary terms. They pay it in terms of risk, the dominant logic of "risk society".

The current agri-*culture* in Switzerland, focusing on the economic profit, omits the social, cultural, political and ecological costs of the production of food for the consumers. This production implies that farmers cultivate their land for the consumers. Yet, according to the farmers and their perceptions of increased bee mortality as a risk this implies that they work *against* "nature". Thus, the farmers work *against* what they identify with. From an *anthropocircumferential* understanding of the farmers interaction with their environment this implies that they work eventually against themselves. Therefore, according to the farmers, increased bee mortality is an example for the price to be paid for the current form of food production linked to the current form of consumption. However, it is not only the consumers or the farmers who pay the price in the form of increased bee mortality. Everybody pays the price. Some farmers point out that "nature" can handle it with regard to the time scale of planet earth, the question is, if human beings can.

Therefore, the area of tension between production and consumption centres on the question of the price society as a whole is willing to pay for the production of the products the consumers consume. Is society as a whole willing to pay the price the consumers don't pay for the products in form of increased bee mortality? Yet, what if the social, cultural, political, economic and ecological price in form of increased bee mortality is too high? Is society as a whole then willing to assume responsibility for increased bee mortality related to the current agri- and consumer culture? The farmers' perceptions of increased bee mortality as a risk indicate that the cultivation of a common ground between producers and consumers is needed. There is a need to link agri-*culture* and consumer culture in order to create a socially, economic and ecologically sustainable food consumption and production.

6.1.2 Farming for sustainability?

Farmers are producers. In order to make production more sustainable, increasing ecological compensation measures - for example to increase biodiversity - are included in the agricultural policy of Switzerland. Some farmers refer to this tendency of "greening" agriculture as "Ballenberg"-agriculture[15], referring to a shift away from food production towards conservation of the landscape. This change involves a change of the farmers' social function, away from farmer and producer to gardener and keeper, as well as their identity.

Simultaneously but contrastingly to this, the agricultural policy of Switzerland focuses on productivity, efficiency and intensification. This implies a change from agri-culture to agri-business, from small scale family farming to bigger farm sizes and contractor based agriculture. The farmers are concerned and worried about this process, referring to agri-business in the USA, Canada or Argentina. They are concerned about it with regard to them being producers in such a context and they are especially concerned about it with regard to its impact on bees in the realm of increased bee mortality as a risk. Against the background that the farm size is the strongest influence factor on the intensity of the perception of increased bee mortality as a risk, the tendency towards bigger farms and the relation to the farmers' environmental consciousness and sensitization, needs to be taken seriously.

For the farmers, these two processes - "greening" and intensification of agriculture - are concurrent and often conflicting. This is also represented by the farmers' perceptions of increased bee mortality as a risk and the rejection of the idea of a bee pasture. It is also represented in the discourses about pesticides and the dilemma of using them or banning them. Thus, these two processes constitute an area of tension related to the overall concept of agri-*culture* in Switzerland. This area of tension centralises on the dilemma of working *against* or *with* "nature". For the farmers this constitutes not only a dilemma, but an increasing burden and additional pressure. Because, the two processes are incompatible. In this context the rejection of ecological compensation measures or the process of "greening" agriculture in general is related to the underlying contradictions of the two contrasting and conflicting processes and not due to a lack of ecological awareness. On the contrary, the perceptions of increased bee mortality as a risk show that the farmers are conscious about

[15] "Ballenberg" is a historic outdoor museum in Switzerland. It is a museum to preserve and present traditional knowledge and skills related to agriculture in Switzerland.

their relation with the environment. The farmers are more environmentally conscious than often assumed.

6.1.3 Being with the environment?

The perceptions of increased bee mortality as a risk exemplify the environmental awareness of the farmers and their "perception of the environment". This is expressed by one farmer as follows:

> A farmer does not only think about himself, I think farmers are... as they work with nature, they think about nature as a whole... if it is a melting glacier or some other environmental disasters or also a draught somewhere in the world, I think it weighs hard on farmers, because they identify with nature.
> (Lorena M.)

When Lorena M., with specific regard to environmental disasters and risks, mentions that farmers think about "nature as a whole", she alludes to what Ingold (2000) describes as a lifeworld, constantly constructed through the active interaction and engagement of human beings with their surrounding. This "anthropo*circumferential*" perception of the environment also includes that farmers perceive risks that happen "somewhere [else] in the world". Thus, this is how the farmers perceive increased bee mortality as risk.

Most farmers do not believe that increased bee mortality can be solved because of the overall framework of human interaction with their surrounding. The farmers point out that the value system underlying the current interaction of human beings with their surrounding is destructive. It is this destructive interaction that leads to unprecedented, global and complex risks like increased bee mortality. The interaction of human beings with the environment is not only destructive with regard to their surrounding, but with regard to themselves, as "humanity destroys itself" (Kurt H.).

Thus, according to the farmers, increased bee mortality is not only an indicator for a disturbed ecosystem balance:

> it is a threat for everything, after all we [human beings] are also a basic part of everything. Even though we like to keep ourselves out of it a bit all the time, we live in the environment, we are no hermits.
> (Brigitte S.)

The farmers' perceptions of increased bee mortality as a risk is neither understood from an ecocentric perspective detaching the environment from human beings nor an anthropocentric perspective centring on human beings, detaching them from the environment. Rather, the farmers perceive increased bee mortality from an "anthropo*circumferential*" perspective. This implies that:

> at some point we [farmers] need to work more *with* nature and not always *against* it. Because otherwise in the end we [human beings] will have nothing, you know.
> (Thomas B.)

Therefore, the farmers' perceptions of increased bee mortality as a risk indicate that human beings need to be(e) with the environment.

7 Conclusion

Bees are, since the beginning of the history of mankind, an essential part of human beings interaction with the environment as a lifeworld. The interaction of human beings with bees - in comparison to other insects - is particular. It transformed over the course of history in many ways. This relation is "more than honey", because, until now, bees are symbolically meaningful. Bees are also closely connected to agriculture, as they are vital pollinators for apple growing, for example in the so called "Mostindien", the eastern part of Switzerland. Hence, farmers are key actors and engage as "perceptually skilled agents" actively with bees. Farmers are local and bound to their place, their land and their farm in terms of space and time, as usually a farm is passed on to the next generation. This place attachment influences the farmers "perception of the environment" and local environmental changes, their *being-in-the-world* and their interaction *with* the environment in order to produce food for society as a whole. It also shapes their interaction with bees and their perception of increased bee mortality. In Switzerland, the phenomenon of increased bee mortality has reached wide attention and concern among farmers and is perceived as a high risk.

With this thesis I aimed to analyse *how* Swiss farmers perceive increased bee mortality as a risk related to other social, cultural, political, economic and ecological risks. In order to do so I applied a "mixed method approach". On the one hand, based on quantitative data and analysis, I focused on the parameters influencing the *intensity* of the perception of increased bee mortality as a risk. On the other hand, I included qualitative data and analysis to account for the *relation* of increased bee mortality with other risks.

The quantitative analysis showed which variables have a statistically significant probability to influence on the intensity of the perception of increased bee mortality as a risk. With regard to the socio-demographic variables only the variable age is significant. The younger the farmers are, the higher they perceive increased bee mortality as a risk. All farm specific variables - farm size, geographical zone and production method - are significant. The bigger the farm size is, the lower is the perception of increased bee mortality as a risk. Organic farmers perceive increased bee mortality as a higher risk, than conventional farmers. Farmers from the mountain region perceive increased bee mortality as a higher risk than farmers from the hill area. With regard to the perception of the future of agriculture, only the variable of the global agriculture is significant. Thus, farmers who

perceive the future of global agriculture pessimistic rate increased bee mortality as a higher risk. This indicates that the perception of global agriculture influences the perception of increased bee mortality as a risk stronger than local agriculture. Thus, farmers are local, but they think globally.

The qualitative analysis of the farmers' perceptions of increased bee mortality as a global risk showed that increased bee mortality as *a risk* is related to the "pollination crisis" in the realm of harvest and nutrition. Agriculture - mainly pollination dependent agriculture - is *at risk* by increased bee mortality. In this context, increased bee mortality is linked to the economic risk of income loss, the ecological risk of an interrupted food cycle and the social risk of an insecure food production. Yet, increased bee mortality is also *at risk* due to the negative impact of industrial agriculture and pesticides on bees. Thus, agri*culture* constitutes *a risk* for increasing bee mortality. Some farmers link increased bee mortality to the political risk of agricultural policy and direct payments, as it reinforces industrial agriculture which harms the bees. With regard to pesticides, the farmers distinguish between pesticides in general and the *use* of pesticides. Referring to pesticides in general, increased bee mortality is related to the ecological risk of pesticides harming the environment, bees and human beings. The use of pesticides is linked differently to increased bee mortality. Whereas, some farmers relate it to the underlying human-environment relation as a cultural risk, other farmers point out that pesticides are applied due to the consumers' expectations, in terms of price and quality. For them pesticide use is a social risk, relating increased bee mortality and current consumption patterns. This relation to consumption is especially pointed out in the farmers' discourses of blame, alluding to the underlying notions of power between farmers and society, between producers and consumers.

The farmers' perceptions of increased bee mortality as a risk embedded in "risk networks" indicate that the notions of being *at risk* and being *a risk* are blurred and overlapping. There is no causal linear relation between a *risk object* and an *object at risk*. There is no clear distinction between cause and effect. The risks are inseparable, they influence, reinforce or contradict each other in complex multi-way links. According to the farmers' perceptions of these "risk networks", risks are simultaneously perceived as *risk object* and *object at risk*. Different farmers link these risks of a "risk network" differently, depending on the individual lifeworld. With the "risk network" approach it is possible to outline *how* increased bee mortality as a risk is linked with other social, cultural, political, economic

and ecological risks. Nevertheless, it is not possible to explain *why* the farmers weigh them differently. To account for this, more research is needed - especially with regard to the impact of farm size, production method and production branch on environmental awareness.

In the broader context, the farmers' perceptions of increased bee mortality as a risk indicate that increased bee mortality is not only an indicator for an unbalanced ecosystem, but also for an unbalanced relation between producer and consumer, between agriculture and "nature" and with regard to the relation of human beings with the environment as a lifeworld. The farmers' perceptions of increased bee mortality as a risk exemplify that this relation is perceived as critical. It is critical due to the anthropogenic influence on bees resulting in increased bee mortality affecting agriculture. Thus, it is not increased bee mortality, but human beings, representing *a risk* for agriculture. It is human beings representing *a risk* for themselves. Therefore, the phenomenon of increased bee mortality needs to be approached and understood from an "anthropo*circumferential* perspective - focusing on the close and interdependent relation between human beings with bees as essential part of their active engagement with the environment as a lifeworld.

The culturally rooted symbolic meaning ascribed to bees might have facilitated the farmers' sensitization for the phenomenon of increased bee mortality as an example of the critical relation of human beings with their environment and its imminent outcomes. Nevertheless, according to the farmers' perceptions of increased bee mortality as a risk embedded in "risk networks", it is not the symbolic meaning, but the social, cultural, political, economic and ecological context that impedes attempts to save the bees. However, it is not merely about saving the bees, but about saving human beings. The farmers' perceptions of increased bee mortality as a phenomenon indicate that they are aware of this. The farmers are more environmentally conscious than supposed. This should be taken into account, especially when it comes to the public discourse on responsibility or future implementation of ecological measures - with regard to the phenomenon of increased bee mortality and beyond.

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Appendix

A The perception of increased bee mortality

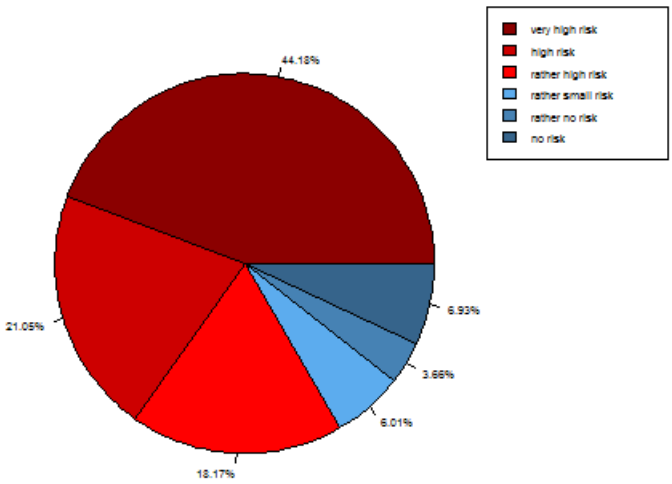


Figure 3: Intensity of perception of increased bee mortality as a risk

B Quantitative data set

The quantitative data used in this thesis is secondary data from the study on risk perception of Agroscope. This data set has been edited as discuss in detail below.

In the survey the farmers have been asked to indicate the intensity of their perception of increased bee mortality on a scale ranging from *very high risk* (1) to *no risk*(6). The farmers furthermore had the option of *don't know* (12). 12 was assigned as "missing value" and is therefore not included in the statistical analysis. Ranking the perception of increased bee mortality in six different groups of rising intensity levels implies that this variable - the dependent variable - is ordered. For the statistical analysis, the values of the perception of increased bee mortality have been recoded in order to align the numbers expressing the intensity with the language use. Concluding from this, in this analysis I ascribed *very high risk* the value of (6) and *no risk* the value of (1).
Age is an interval variable. It was questioned based on birth year and has been recoded for the model by calculating the real age in years.
Sex is a binary variable consisting of female (0) and male (1).
Education includes 3 different levels. The different education outcomes of the survey have been summarized to 3 different education levels. Low education (1) refers to obligatory school eduction, middle education (2) refers to a professional education (farming apprenticeship) including also those farmers who have a farming craftsman certificate, and high education (3) refers to farmers with tertiary education equivalent to a university degree.
Children is a binary variable consisting of two outcomes, farmers who do not have children (0) and farmers who do have children (1).
Geographical zone refers to lowland (3), hill (2) and mountain (1) region.
Farm size is an interval variable, covering the cultivated area of a farm in hectares.
Production method is also a binary variable. The data from the survey has been recoded from seven different types of production method to only two outcomes - conventional (0) and organic (1) farmers.
Perception of the future - farm, agriculture in Switzerland, agriculture worldwide - are ordered variables ranging from *very optimistic* (1) to *very pessimistic* (4).

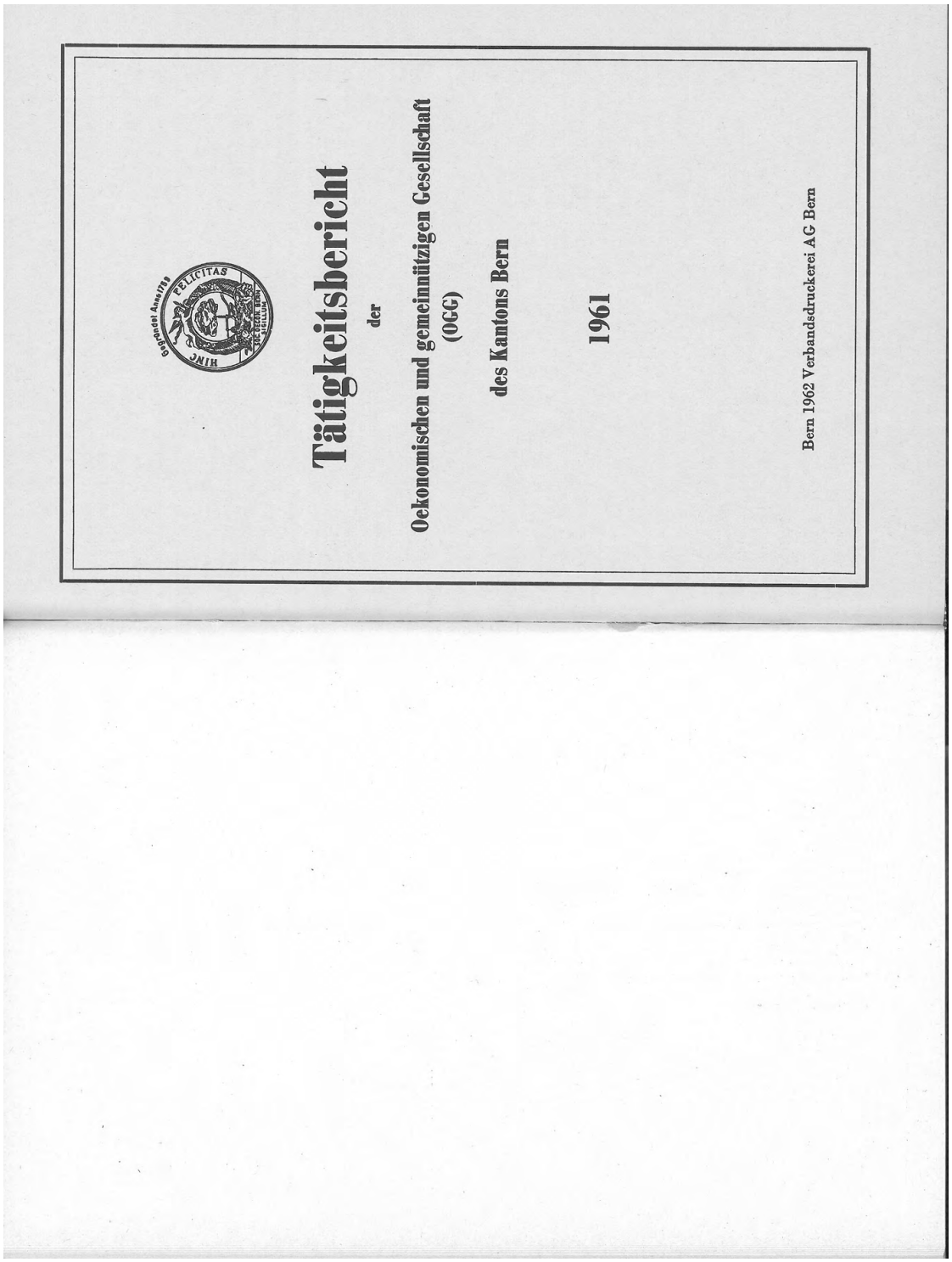
C Qualitative data: Interview overview

Overview: Interviews

Qualitative Data

Name	Sex	Age	Children	Education	Canton	Production method	Production branch	Function	Bee keeper experience	Bee keeper interaction	Bee dependent production
Brigitte S.	f	54	x	high	Thurgau	organic	milk	Housewife			standard trees
Peter W.	m	50	x	middle	Zürich	conventional	winery, mother cow, cattle	Farmer		x	
Kurt H.	m	62	x	middle	Zürich	conventional	mother cow, cattle	Mechanic, Farmer	x		standard trees
Thomas B.	m	56	x	middle	Zürich	conventional	horses, crop cultivation	Police officer, Farmer			rapeseed
Christian L.	m	52	x	middle	Zürich	conventional	cattle rearing	Farmer		x	standard trees
Charlotte K.	f	43		middle	Thurgau	conventional	milk	Farmer		x	
Verena R.	f	36	x	middle	St. Gallen	conventional	cattle rearing	Mother, Housewife		x	standard trees
Lorena M.	f	27		high	Thurgau	conventional	milk,	Student			standard trees
Jürg A.	m	46	x	middle	Aargau	organic	poultry, berries	Farmer		x	berries
Hans V.	m	62	x	middle	Zürich	organic	mother cow, cattle rearing, crop cultivation	Farmer		x	standard trees, vegetables
Sophie T.	f	40		high	Zürich	organic	mother cow, cattle rearing, sheeps	School principle, Farmer			

D Archive data: Bee keepers association of Bern (1862-1962)



Tätigkeitsbericht

der

Oekonomischen und gemeinnützigen Gesellschaft

(OGG)

des Kantons Bern

1961

Bern 1962 Verbandsdruckerei AG Bern

100 Jahre Vereinigung der bernischen Bienenzüchter 1862–1962

Von Ernst Maibach

Erkenntnis und Praxis

Erstaunlich ist es, wie früh das Leben der Bienen im Dasein der Menschen eine Rolle spielte. Schon die ältesten Kulturvölker kannten die Biene und schätzten sie als Spenderin von Honig und Wachs. Ja, wir können mit Sicherheit annehmen, dass auch der vorgeschichtliche Mensch, von dessen Lebensepoche wir sonst so wenig wissen, in seinem Existenzkampf der Biene das abzugewinnen versuchte, was seinem Lebensunterhalt dienen konnte. Und wenn ihm auch damals der Bär die Beute streitig machte, so blieb doch endlich der Mensch, der Erfindungsreiche, dank seiner Werkzeuge Sieger in dieser Praxis des Raubes.

Die Erkenntnis aber, dass die vom Menschen hart bedrängte Kreatur nur dann regelmässig ausgenutzt werden kann, wenn man ihr das zur Erholung Notwendige belässt, führte nach und nach zur Praxis der Bewirtschaftung, die sich mit der Erforschung der biologischen Zusammenhänge immer mehr verfeinerte.

Verwunderlich ist es allerdings, dass dieses Wissen der Gelehrten gerade die Praxis der Bienenhaltung lange Zeit recht wenig beeinflusste, dass zum Beispiel die Bienenwohnungen und Erntemethoden durch viele Jahrhunderte fast die gleichen blieben. Es mag dies daher rühren, dass die Ergebnisse der wissenschaftlichen Forschung im Altertum und Mittelalter nur einem engen Kreis Auserwählter zugänglich waren und kaum hinausdrangen in den Alltag der Völker. Erst mit der Erfindung der Buchdruckerkunst wurden die Erkenntnisse der Wissenschaft ins Volk hinausgetragen und wiesen der praktischen Bewirtschaftung die neuen Wege.

Von der Liebhaberei zum Wirtschaftszweig

Die Beschäftigung mit Bienen ist die Poesie in der Landwirtschaft, wird mit Recht verkündet. Wer aber nicht, wie der Bauer, mit der Vielfalt der Schöpfung täglich in Berührung steht, hat diese Poesie, diese Erfrischung des Gemütes, erst recht nötig. Aus den Werkstätten mit ihrem Lärm, der Gleichförmigkeit der Büroarbeit oder Enge der Studierstube, muss sich der Mensch hie und da lösen, um wiederum das Paradies zu finden, das ihm verloren ging. Die Bienen zeigen ihm den Weg. Maurice Maeterlinck sagt: „Sie lenken seinen Sinn auf den heitern Junitag, sie öffnen ihm das Herz für den Zauber der schönen Jahreszeit, und

alles, woran sie Anteil haben, verknüpft sich in der Vorstellung mit blauem Himmel, Blumensegen und Sommerlust. Sie sind die eigentliche Seele des Sommers, die Uhr der Stunden des Überflusses, der schnelle Flügel der aufsteigenden Düfte, der Geist und Sinn des strömenden Lichtes, das Lied der sich dehnenden, ruhenden Luft, und ihr Flug ist das sichtbare Wahrzeichen, die deutliche musikalische Note der tausend kleinen Freuden, die von der Wärme erzeugt sind und im Lichte leben. Sie lehren uns die zarteste Stimme der Natur verstehen, und wer sie einmal kennen und lieben gelernt hat, für den ist ein Sommer ohne Bienensummen so unglücklich und unvollkommen, wie ohne Blumen und ohne Vögel."

Von dieser Seite her betrachtet wird nun allerdings die Bienenzucht vom nüchternen Materialisten als reine Liebhaberei abgetan und volkswirtschaftlich kaum beachtet. Gar leicht wird übersehen, dass in der Volkswirtschaft nicht nur der verdienende, sondern auch der mitfühlende, das heisst, der ganze Mensch, zählt. Es gibt eben recht viele Dinge auf unserem Erdenrund, die wenig oder gar keine Zinsen abwerfen und dennoch als Glieder in der Kette der Schöpfung unendlich wichtiger sind, als die grösste menschliche Betriebsamkeit. Das Leben der Bienen ist in dieser Beziehung geradezu ein Schulbeispiel.

Der grosse volkswirtschaftliche Wert des Bienenvolkes liegt nicht in der Produktion von Honig und Wachs. Zehnmal wichtiger ist die unbeabsichtigte Nebenwirkung seiner Tätigkeit, die Befruchtung der Blüten und Blumen zur Sicherung der Obsternten und der Samengewinnung. Schädigen wir durch kurzsichtige Massnahmen die Lebensbedingungen der Bienenvölker, so zieht dies unweigerlich den Obstbau und die Samengewinnung in Mitleidenschaft. Im Zuge der scharfen Rationalisierung im Futterbau, der bedenkenlosen Absenkung des Grundwasserspiegels bei Meliorationen, der unnötigen Abholzung aller Hecken und Gebüsche, um angeblich Kulturland zu gewinnen, wird die Bienenweide erheblich verschlechtert und somit der Bienenbestand geschädigt. Das biologische Gleichgewicht ist in diesem Lebenskreis gefährdet und mahnt zum Aufsehen.

Welche Bedeutung der Tätigkeit der Biene als Blütenbefruchterin zukommt, haben wissenschaftliche Versuche einwandfrei festgestellt. Prof. Dr. Kobel, Dr. Zander und eine Reihe anderer Forscher haben unabhängig voneinander in vielen Versuchen herausgefunden, dass alle Kernobstsorten und die Süsskirschen nur mit sortenfremdem Blütenstaub befruchtet werden können. Da nun die Windbestäubung nach den neuesten Forschungen nicht in Frage kommt, bleibt nur noch die Übertragung des Blütenstaubes durch Insekten übrig, und hier leistet dann die Biene die Hauptarbeit, weil sie allein im Volksverband überwintert und zur Zeit der Obstblüte Flugbienen in verschwenderischer Zahl an der Arbeit sind. Aber auch bei den Selbstbefruchtern, zu denen einige Sorten der Sauerkirschen, der Pflaumen und Zwetschgen, die Gruppe der Pfirsiche und Aprikosen, die Quitten und das Beerenobst gehören, können die Erträge bis um das Zwanzigfache gesteigert werden, wenn sie starken Bienenbesuch erhalten.

Zusammenfassend ist festzuhalten, dass über 80% aller Obstarten und ungefähr 50% aller Kulturpflanzen auf die Blütenbestäubung durch die Bienen angewiesen sind.

Bedenken wir ferner, dass auf den Blüten des Wiesenfutters eine Hefenart lebt, die die Verdauungsvorgänge im Wiederkäuermagen stark beeinflusst, und die von den Bienen mit dem Blütenstaub zur Vermehrung weitergetragen wird, so dürfen wir füglich erklären, die Bienenzucht sei als sehr wertvoller Zweig unserer Landwirtschaft zu betrachten.

Nach vorsichtigen Schätzungen erreicht der jährliche Ertragswert aus der Tätigkeit der Bienen in der Honigproduktion durchschnittlich rund zwanzig Millionen Franken, in der Blütenbefruchtung aber bis zweihundert Millionen.

Umwälzungen in der Praxis der Bienenhaltung

Angeregt durch die Schriften von J. J. Rousseau (1712–1778) brach um die Mitte des 18. Jahrhunderts die Zeit der Aufklärung und geistigen Wiedergeburt an. In mächtigem Freiheitsdrang löste man sich aus den Fesseln und Schablonen veralteter Gewohnheiten und fand sich wieder zurück zum Urquell alles Lebens, zur Natur, zum Landleben. Es waren vorerst die intellektuellen Kreise, die von dieser Bewegung erfasst wurden. In der Literatur, in der Malerei, ja auch im Kunstgewerbe war die ländliche Idylle tonangebend. Im Kanton Bern waren es die gnädigen Herren, die sich darüber hinaus mit der praktischen Seite dieser Idylle, der Landwirtschaft, ernsthaft und realistisch denkend, beschäftigten. Auf ihren Gütern hoben sie die Dreifelderwirtschaft auf, führten neue Bewirtschaftungsmethoden ein und erprobten neue Werkzeuge und Maschinen, die die Arbeit des Bauern erleichtern und die Erträge steigern sollten. Es wurde Pionierarbeit geleistet. Die 1759 gegründete Oekonomische und Gemeinnützige Gesellschaft von Bern fasste alle diese Einzelbestrebungen zusammen und gab ihnen Richtung und Ziel.

Auch die Bienenhaltung wurde von diesem frischen Zug erfasst. Persönlichkeiten wie Frau Vicat geb. Courtet, der Oekonomischen Gesellschaft von Bern und Losanen, Mitglied, und Herr Niklaus Emanuel Tscharner, des grossen Raths und der Oekonomischen Gesellschaft zu Bern, Sekretär, machten sich mit praktischen Versuchen daran, die mittelalterlichen Methoden der Bienenpflege durch eine, der Eigenart des Bienenvolkes besser entsprechende Behandlung zu ersetzen. Frau Vicat baute sich einen gläsernen Beobachtungskasten und versuchte bei ihren Hantierungen die Bienen mit Wasser, statt mit Rauch, zu beruhigen. Herr Tscharner baute ungefähr 15 cm hohe Untersatzringe für die Strohkörbe, von denen die Völker im Laufe des Sommers gewöhnlich zwei ausbauten, so dass man den Korb als Honigraum im Herbst wegnehmen konnte, ohne das Brutnest zu stören. Schliesslich aber setzte der blinde François Huber, Genf, mit seinen klassischen Forschungsergebnissen allen Erneuerungsbestrebungen in der Bienenhaltung die Krone auf. Er war es, der auf den genialen Gedanken kam, den unbeweglichen Wabenbau der Korbimkerei in bewegliche Einzelwaben aufzuteilen und diese in seiner „Rahmenbude" zum Mobilbau zu vereinigen, der erst die moderne Bienenzucht ermöglichte. Bekannt wurden die Neuerungen Hubers im Kanton Bern aber erst, als der Berner Patrizier, Herr G. E. von Morlot, vormals Mitglied des souveränen Raths der Stadt und Republik Bern,

die Schriften Hubers ins Deutsche übersetzte, mit vielen eigenen Beobachtungen ergänzte und einen brauchbaren Kasten für den Mobilbau konstruierte. Sein Buch, das 1839 unter dem Titel „Die Bienenzucht theoretisch und praktisch, unter Berücksichtigung der verschiedenen Klimate" herauskam, enthält eine Fülle exakter Beobachtungen und praktischer Anregungen, die dem damaligen Stand der Bienenhaltung weit vorausgingen. Aber trotz dieser bahnbrechenden Vorschläge blieb im Kanton und auch anderswo im Schweizerland die alte Korbimkerei vorläufig bestehen, und nur ein kleiner Bruchteil der Bienenhalter begann sich allmählich mit den Neuerungen zu befassen.

Zuerst waren es die beiden Freunde Peter Jakob, Lehrer in Fraubrunnen, und Christian Bürki, Werkführer in der Zündkapselfabrik Liebefeld, die sich als praktische Bienenzüchter ernsthaft mit dem Problem des Mobilbaues beschäftigten.

Peter Jakob war vorerst eher zurückhaltend, abwägend und berechnend, denn für ihn war die Bienenzucht nicht eine Liebhaberei, sondern ein wichtiger Bestandteil seines Einkommens, denn sein Jahresgehalt als Lehrer betrug damals 100 alte Franken und später, ab 1836, waren es 150 Franken. Genau berechnete er die Kapitalaufwendungen und den möglichen Ertrag, um den wahrscheinlichen Gewinn oder Verlust zu ermitteln.

Christian Bürki betrachtete die Beschäftigung mit den Bienen mehr als ein erholsames Gegengewicht zu seiner Berufstätigkeit. In seiner Freizeit baute er einen Bienenkasten, dessen Innenmasse 62,5 cm Höhe, 54 cm Tiefe und 30 cm Breite betrugen und füllte ihn mit zwei übereinanderstehenden Wabenreihen. Die Waben waren 24 cm hoch und 30 cm breit und ihre Trägerleisten liefen in zwei Nutenpaaren der Kastenwände. Bürki wollte nur ein Wabenmass haben, das als Brut- oder Aufsatzwabe überall verwendet werden konnte.

Peter Jakob fand, die Brutwaben von 24 cm Höhe seien zu niedrig, um darauf die Völker ohne Gefahr überwintern zu können. Er machte sie 32 cm hoch und setzte darüber Honigwaben von 16 und 8 cm Höhe.

Als Christian Bürki 1864 starb, verbreitete Peter Jakob mit viel Geschick und Energie die Erfindung seines Freundes und baute sich einen Bienenpavillon mit 160 Bürkikasten, damals das grösste und schönste im Schweizerland. Es wurde zum Mekka der Imker, denn wer in der Bienenzucht etwas Tüchtiges leisten wollte, holte sich Rat bei Peter Jakob in Fraubrunnen.

Später verbesserte Pfarrer Jos. Jeker, Olten, den Bürkikasten, indem er die Brutwaben auf 36 cm erhöhte und zwei Honigaufsätze von je 12 cm Höhe verwendete. Dieser Bürki-Jeker-Kasten wurde dann zur gebräuchlichsten Bienenwohnung in der Schweiz, zum Schweizer Kasten.

Mit dem Übergang vom Stabilbau zum Mobilbau, vom Korb zum Kasten, eröffneten sich den eigentlichen Zuchtbestrebungen in der Imkerei ungeahnte Möglichkeiten. Zur Vermehrung des Völkerbestandes war man nicht mehr auf das Schwärmen der Völker angewiesen. Man konnte Völker teilen, Königinnen wegnehmen, Königinnenzellen in Ablegern verwerten und den Honig ernten, ohne die Völker zu massakrieren.

Der Mobilbau wäre aber kaum so rasch populär geworden ohne die geniale Erfindung des württembergischen Schreiners Mehring, der hölzerne Druckstöcke mit Zellanfängen herstellte und damit auf dünn ausgewalzte Wachsblätter die heute bekannten Mittelwände prägte. Diese Idee kam damals so überraschend, dass sie von allen prominenten Imkern kurzerhand abgelehnt wurde. Enttäuscht schenkte Mehring die Druckstöcke Herrn Prof. Menzel in Zürich, der sie an der schweizerischen Imkertagung 1861 in Olten an Peter Jakob weitergab. Dieser erkannte als erster sofort die umwälzende Bedeutung der Erfindung.

Vorerst stellte er diese Kunstwabenböden, wie er sie nannte, für den Bedarf auf dem eigenen Stand her, zeigte sie dann allen Besuchern, pries ihre Vorteile an den Imkerversammlungen und schickte sie sogar an die Weltausstellung 1867 in Paris, wo sie allerdings kaum beachtet wurden. Nach und nach fanden sie aber in der fortschrittlichen Bienenzucht unseres Landes immer mehr Anklang, und Peter Jakob wurde zum ersten Kunstwabenfabrikanten. Jährlich stellte er an die 20 000 Kunstwabenböden in 50–70 verschiedenen Formaten her. Den Arbeitsvorgang musste er in vielen Versuchen erst selber entwickeln und die Fabrikation mit den primitivsten Einrichtungen bewältigen. Sein Sohn Rudolf, der nach dem Tode des Vaters die Kunstwabenfabrikation kurze Zeit weiterführte, übergab diese dann an Jos. Baumeler in Schüpfheim.

Gründung des Vereins bernischer Bienenwirte und seine Entwicklung

Die rasch aufeinanderfolgenden Umwälzungen in der Imkerpraxis riefen nun aber auch einer planmässigen Schulung der Bienenzüchter. In Versammlungen und Kursen wurde das Neue vorgeführt und ausprobiert. Die Träger dieser ausgedehnten Bildungsarbeit konnten aber auf die Dauer nur die Imkervereine sein, ein Zusammenschluss der geradezu zum Bedürfnis wurde.

Am 1. September 1861 kamen fortschrittlich gesinnte Imker in Olten zusammen und gründeten den Verein schweizerischer Bienenwirthe. Es waren Männer, die in ihren Landesteilen die treibenden Kräfte darstellten. Aus dem Bernbiet waren anwesend: Peter Jakob, Fraubrunnen, G. Wenger, Lehrer, Bern, und David Matti, Direktor der Rütti, Zollikofen.

Schon damals besprachen sie die Gründung eines bernischen Vereins. Am 7. Oktober 1862 kamen sie bei G. Wenger in Bern zusammen, bildeten ein Initiativkomitee und verschickten eine Einladung zur ersten Versammlung vom 26. Oktober 1862 auf der Landwirtschaftlichen Schule Rütti. 21 Bienenzüchter fanden sich ein und beschlossen die Gründung des Vereins bernischer Bienenwirthe. Direktor David Matti wurde zum Präsidenten gewählt. Der Verein hatte vorerst nur einen losen Zusammenhang, denn es bestanden noch keine Statuten.

1865 trat David Matti zurück, verblieb aber im Vorstand. Die Vereinsleitung übernahm Peter Jakob. 42 Imker waren damals angeschlossen. Der neue Präsident entfaltete eine energische Tätigkeit, entwarf Statuten und ein Arbeitsprogramm und liess sie in der Versammlung vom 6. November 1866 genehmigen. Der Vorstand wurde für 3 Jahre wie folgt gewählt:

Präsident: Peter Jakob, Fraubrunnen.
Vizepräsident: L. Gerster, V.D.M. Aebischlössli, Bern.
Aktuar: G. Wenger, Lehrer, Bern.
Kassier: Friedr. Ledermann, Vorsteher, Landorf.
Beisitzer: David Matti, Direktor, Rütti.

Was diese Pioniere der Bienenzucht, vor allem Peter Jakob, leisteten, nötigt uns Hochachtung ab. Sie fühlten sich als Träger einer Mission, die zu erfüllen, ihnen vaterländische Pflicht war. Der Verein hielt jährlich mindestens 3 Versammlungen ab, an denen jedesmal Fragen aus der Imkerpraxis mit beispielhafter Gründlichkeit erörtert und die in wilder Fülle angepriesenen Imkergerätschaften auf ihre Brauchbarkeit geprüft wurden. Man erwog sogar die Schaffung einer zentralen Prüfungs- und Vermittlungsstelle für Gerätschaften, doch scheiterte diese Gründung an den fehlenden Finanzen und dem kleinen, wenig aufnahmefähigen Absatzgebiet.

Unter der zielbewussten Führung von Peter Jakob gedieh der Verein und wurde zur stärksten Imkervereinigung unseres Landes. Eine Übersicht aus dem Jahre 1870 zählt 15 Kantonal- und Lokalvereine auf mit 882 Mitgliedern. Davon gehörten dem schweizerischen Verein 138 Imker an, während der bernische Verein deren 166 zählte.

Interessant ist es, an Hand des damaligen Mitgliederverzeichnisses festzustellen, wie sich die Imker im Kanton Bern auf die verschiedenen Berufsgruppen verteilten. Landwirtschaft, Gewerbe, Handel und Industrie stellten 72,3 % der Mitglieder, während 27,7 % auf Pfarrer, Lehrer, Beamte, Ärzte und Juristen entfielen. Am stärksten vertreten war die Landwirtschaft mit 42,8 %. Und doch war damals im Kanton Bern nur ein kleiner Teil der bäuerlichen Bienenhalter dem Verein angeschlossen. Bei einer amtlichen Betriebszählung hätte sich also ihr Anteil noch ganz erheblich vergrössert. Im Laufe der Jahrzehnte veränderte sich dieses Verhältnis nicht wesentlich, obschon die Zahl der landwirtschaftlichen Betriebe zurückging. Die kleine Gruppe der Lehrer und Pfarrer (15 %) besorgte vor allem die administrative Arbeit und übernahm die theoretische und praktische Ausbildung der Bienenzüchter.

Die eidgenössischen Viehzählungen zeigen ferner, dass in bezug auf die Zahl der Bienenvölker stets eine gewisse Konstanz im Verhältnis zwischen dem eidgenössischen und bernischen Bestand vorhanden war. Es wurden gezählt:

Im Jahr	Bienenvölker Eidgenossenschaft	Kanton Bern	%
1876	177 795	39 226	22,0
1886	207 373	40 821	19,6
1946	326 788	73 464	22,4
1956	298 289	71 416	23,9

In den Jahren nach 1946 ist der Völkerbestand ständig im Abnehmen begriffen, aber noch stärker ging die Zahl der Bienenbetriebe zurück. Vor allem betraf es diejenigen unter zehn Völkern. Diese Abnahme ist auf verschiedene

Ursachen zurückzuführen, die untereinander in einem kausalen Zusammenhang stehen. Allmähliche Verschlechterung der Bienenweide durch die schon erwähnte Umstellung im Futterbau und zu rigorose Meliorationen, eine Reihe schlechter Honigjahre und infolgedessen ein Ausbleiben des Nachwuchses an Imkern.

Der Verein bernischer Bienenwirthe konnte aber auf die Dauer das grosse Gebiet, aus dem sich seine Mitglieder rekrutierten, nicht so intensiv betreuen, wie es für eine gründliche, alle Imker umfassende Ausbildung wünschbar gewesen wäre. So war es denn eine ganz natürliche Erscheinung, dass sich die Imker in lokalen Vereinigungen zusammenfanden, um die im engern Bezirke sich bietenden Möglichkeiten zu besprechen, praktische örtliche Erfahrungen auszutauschen und die Bienenzucht den lokalen Verhältnissen anzupassen. Wie in der übrigen Tierzucht, gibt es auch in der Bienenzucht keinen allgemeingültigen Leitfaden der Ausbildung, der für alle Gebiete verbindlich sein könnte.

Die Bienenzucht, die OGG und der Verband bernischer Bienenzüchter

Als eine Entscheidung von besonderer Tragweite darf der Eintritt des Vereins bernischer Bienenfreunde, wie er nunmehr genannt wurde, in die Oekonomische und gemeinnützige Gesellschaft des Kantons Bern im Jahre 1892 gewertet werden. Ihre breite Grundlage und das rege Interesse, das sie der Bienenzucht entgegenbrachte, gaben den Imkern Zuversicht und Freude, die grossen Aufgaben, die noch der Lösung harrten, frisch anzupacken. Noch im gleichen Jahre, vom 18. bis 21. April, führte die Gesellschaft in Verbindung mit dem Vereinsvorstand einen Instruktionskurs für Kursleiter und Wanderlehrer durch und schuf so die Voraussetzung für eine Belebung des Bildungswesens in der Bienenzucht. Die OGG wurde zur treibenden Kraft. Im Jahre 1901 setzte sie eine besondere Subkommission für Bienenzucht ein, die aus Mitgliedern der Bienenzüchtervereine bestand. Als ihren Aufgabenbereich umschrieb sie die Schaffung, Subventionierung und Inspektion von Belegstationen, die Honigreklame und Hebung des Honigabsatzes und die Unterstützung von Standinspektionen. Es war die Zeit, in der Dr. U. Kramer seine Rassenzucht des Schweizer Imkers durchsetzte, wo man sich wieder der Stämme unserer Landrasse annahm und die schlimme Verbastardisierung durch Italiener und Krainer Bienen wieder einigermassen auszumerzen suchte. Erfreulich ist es, festzustellen, wie die Praxis der Rassenzucht in den seither verflossenen sechzig Jahren bis in die hinterste Talschaft unseres Kantons verbreitet wurde, wie sich überall Zuchtgruppen bildeten, die mit Umsicht und Ausdauer aus den an Klima und Vegetation gewöhnten lokalen Bienenstämmen das Beste herauszuholen suchen.

Mit der Schaffung der Subkommission für Bienenzucht löste sich der Verein bernischer Bienenfreunde auf, weil diese nun seine Aufgaben übernahm. Gleichzeitig traten aber alle lokalen Vereine der OGG bei, und 1919 schlossen sich diese zum Verband bernischer Bienenzüchtervereine zusammen. Die Subkommission amtete von nun an zugleich als Vorstand des Verbandes, und durch diese Personalunion gestaltete sich die Zusammenarbeit noch enger. Das jeweils von der Subkommission aufgestellte Arbeitsprogramm für das Kurs- und Vor-

tragswesen wurde schon 1905 in das allgemeine Tätigkeitsprogramm der OGG aufgenommen und die Veranstaltungen entsprechend honoriert. Das bedingte natürlich eine entsprechende Beitragspflicht, die gegenwärtig 25 Rappen pro Imker beträgt.

Der Verband bernischer Bienenzüchtervereine bezieht für seine Kasse ebenfalls 25 Rappen pro Vereinsmitglied. Aus diesen Beiträgen werden Belegstationskönigin nen mit 3 Franken subventioniert, Entschädigungen bei kantonalen Tagungen, Ausstellungen und Kursleiterkursen sowie alle übrigen finanziellen Verpflichtungen, die die OGG nicht übernehmen kann, bestritten.

Am 7. Februar 1954 gab sich der Verband neue Satzungen, die diejenigen vom 8. Mai 1920 ersetzen. In diesen ist der Zweck des Verbandes wie folgt umschrieben:

1. Freie Besprechung und Erledigung aller in das Gebiet der Bienenzucht und Bienenpflege einschlagenden Fragen.
2. Veranstaltung von Lehrkursen.
3. Anordnung von bienenwirtschaftlichen Ausstellungen.
4. Abhaltung von kantonalen Imkertagen.
5. Honigreklame, Verwertung des Honigs und Kontrolle der festgesetzten Preise.
6. Vertretung der Interessen des Verbandes gegenüber den kantonalen Behörden, der Oekonomischen und gemeinnützigen Gesellschaft des Kantons Bern sowie dem Verein deutschschweizerischer Bienenfreunde.

Denselben Aufgabenkreis umfasst auch die Subkommission für Bienenzucht der OGG, so dass mit vereinten Kräften dem gleichen Ziele zugestrebt wird.

Alle Vereinsmitglieder des bernischen Verbandes sind ohne weiteres auch Mitglieder des Vereins deutschschweizerischer Bienenfreunde, weil die Prämienzahlung der Imker an die von Fritz Leuenberger im Jahre 1909 mit Bundeshilfe geschaffene obligatorische Faulbrutversicherung diese Mitgliedschaft nach sich zieht.

Durch die Veranstaltung von Imkertagen und die Beschickung von landwirtschaftlichen und gewerblichen Ausstellungen sucht der Verband das Interesse an der Bienenzucht stets wachzuhalten und durch die seit 1957 jährlich in der Gartenbauschule Oeschberg durchgeführten Kursleitertagungen das brauchbare Neue in der Praxis hinauszutragen in die Vereine.

Die Zahl der durch die Mitgliedschaft der Lokalvereine der OGG angeschlossenen Imker nahm rasch zu. 1892 waren es 408, im Jahre 1924 zählte man schon 19 Vereine mit 3754 Imkern und 1947 wurde der höchste Bestand mit 25 Vereinen und 7635 Imkern erreicht. Dann begann die rückläufige Bewegung, und 1960 waren es nur noch 5687 Bienenzüchter. Die Zahl der Vereine blieb gleich. Dieser Rückgang von 25,5% innert so wenig Jahren mahnt zum Aufsehen. Aufgabe des Verbandes wird es sein, den Ursachen dieser ungewöhnlichen Erscheinung alle Aufmerksamkeit zu schenken und geeignete Gegenmassnahmen zu ergreifen.

Die Bienenzeitung für die Schweiz

Die vielen Fragen, die durch die Umgestaltung der Imkerpraxis aufgeworfen wurden, konnten an den Vereinsversammlungen viel zu wenig gründlich beantwortet werden. Zudem wurde auf diese Weise nur ein kleiner Teil der Imker erfasst. Es fehlte eine Zeitschrift, die es ermöglichte, die neuen Erkenntnisse ausführlich darzulegen und der ganzen Imkerschaft zugänglich zu machen.

Von 1862–1864 wurde zwar die „Schweizerische Seidenbau- und Bienenzeitung" herausgegeben, in deren Spalten regelmässig Mitteilungen und Aufsätze über die Bienenzucht veröffentlicht wurden. Doch dieses Publikationsorgan ging ein, als man die Aussichtslosigkeit der Seidenraupenzucht nördlich der Alpen einsah und daher diesen Erwerbszweig fallen liess. 1865 und 1866 erschien die Schrift noch unter dem Tittel „Schweizerische Bienenzeitung", musste aber aus Mangel an Abonnenten und Mitarbeitern Ende 1866 ihr Erscheinen einstellen. Damit waren auch die Imker ihres Sprechsaals beraubt. Was war zu tun? Der Verein schweizerischer Bienenwirthe wagte es nicht, eine eigene Zeitung zu gründen, weil er nicht an den Erfolg glaubte.

In dieser kritischen Lage ergriff Peter Jakob mit geradezu ansteckendem Optimismus die Initiative. Im November 1868 wies er in einem Zirkular an alle Bienenfreunde des Schweizerlandes die Notwendigkeit einer Bienenzeitung für die Schweiz nach und forderte sie zum Abonnement und zur Mitarbeit auf. Mit C. Langlois, Burgdorf, schloss er einen Vertrag über den Druck und Verlag ab, und im Januar 1869 erschien die erste Nummer der „Bienenzeitung für die Schweiz". Als Herausgeber und Redaktor umriss Peter Jakob in einer Mitteilung an die Leser Zweck und Ziel der Zeitung wie folgt:

„Das Blatt bezweckt Hebung der vaterländischen Bienenkultur durch Belehrung in allen Richtungen der Bienenkunde, über die Produkte derselben, deren zweckmässigste Gewinnung, Verwendung und Verwertung, über den betreffenden Handel, über Statistik usw., und macht sich gleichzeitig zur Aufgabe, ein Bildungs- und Veredlungsmittel im Kreise seiner Leser zu sein."

Das war ein hohes Versprechen und brauchte Hingabe und Selbstvertrauen, es zu erfüllen. Spontan sicherten ihm seine Freunde im Vorstand und die namhaftesten Bienenzüchter des Schweizerlandes ihre Mitarbeit zu, und schon im ersten Jahre erreichte das Blatt eine Auflage von 500 Exemplaren. Man spürt schon aus den ersten Nummern die freudige Begeisterung, mit der wissenschaftliche und praktische Erkenntnisse dargelegt wurden, und Pfarrer K. J. Wetter, Krinau, sagte schon in seinem ersten Beitrag: „Nur durch Wahrheit und Gewissenhaftigkeit, nicht aber durch allerlei Schwindel und Humbug wird der Imkerei, wie jeder Kunst und Wissenschaft, gedient." Wer etwas Vernünftiges vorzubringen hatte, kam zu Wort und wurde als Mitarbeiter begrüsst. Merkwürdig, wie viele der aufgeworfenen Probleme von damals noch heute immer wieder diskutiert werden müssen. Schon zu jener Zeit beschäftigten die Rassenfrage, die Vermehrung durch Königinzucht, Bienenweide und Honigernte, Rentabilität der Bienenhaltung, Absatz der inländischen Produkte der Imkerei, die Überwinterung der Bienenvölker, ihre Fütterung, die Bienenkrank-

heiten und andere Fragen den besorgten Imker. Und wenn wir auch glauben, es heute in der wissenschaftlichen Forschung und Erkenntnis recht weit gebracht zu haben, so müssen wir anderseits doch feststellen, dass wir in der einfühlenden Praxis, im Umgang mit den Bienen, noch gar vielen Irrtümern unterworfen sind, weil wir immer wieder, als „Herren der Schöpfung", recht täppisch in den rätselhaften Lebenskreis des Biens eingreifen.

Von den führenden Bienenzüchtern unseres Landes wurde damals die „Eichstädter Bienenzeitung", das Organ des Vereins deutscher Bienenwirthe, ziemlich häufig abonniert. Sie kostete aber 8 Franken und war nicht auf unsere Praxis zugeschnitten. Es ist daher begreiflich, dass die „Bienenzeitung für die Schweiz" mehr und mehr Boden gewann, weil sie unsern Verhältnissen besser diente und mit ihren 3 Franken Abonnementsgebühr den Charakter eines gemeinnützigen Unternehmens hatte.

Als Peter Jakob im Herbst 1878 im Alter von 62 Jahren starb, ging die „Bienenzeitung" in den Besitz des schweizerischen Vereins über, und Phil. Ritter, Fürsprecher in Biel, der spätere Bundesarchivar, wurde ihr Redaktor. Später ging die Schriftleitung an Pfarrer Jos. Jeker in Olten über, der sie auf 1. Januar 1893 an Lehrer Göldi-Braun in Altstätten übergab. Ab 1939 zeichnete Dr. O. Morgenthaler, der Leiter der Bienenabteilung Liebefeld, als verantwortlicher Redaktor. Auf ihn folgte 1952 Dr. Kurt Meier, Oberglatt, und heute besorgt Jakob Lutz, Ing.-Agr., Flawil, die umfangreiche Arbeit.

Auch Druck und Verlag der „Schweizerischen Bienenzeitung", wie die Monatsschrift heute heisst, wechselten einigemal. C. Langlois, Burgdorf, trat sie 1879 an die Buchdruckerei Krebs in Burgdorf ab und 1882 übernahm sie der Verlag Schwendimann in Solothurn. Nach diesem häufigen Wechsel fand sie 1886 sozusagen eine bleibende Heimat, als sie der Verlag H. R. Sauerländer in Aarau zu betreuen begann und heute noch betreut.

Die „Schweizerische Bienenzeitung" ist zu einem angesehenen Fachblatt von internationaler Geltung geworden, nicht zuletzt auch dank der vorzüglichen drucktechnischen Ausstattung durch den Verlag Sauerländer.

Die Rentabilität der Bienenzucht und die Verwertung der Produkte

Als Wirtschaftszweig gewann die Bienenzucht durch ihren direkten und ganz besonders den indirekten Ertrag mehr und mehr an Bedeutung. Kaufmännisches Denken fand auch in der Imkerei Eingang, prüfte ihren Aufwand, ermittelte den Ertrag und suchte nach der Rendite.

Der Aufwand für einen Bienenzuchtbetrieb kann sehr verschieden gestaltet werden, je nachdem man nur das praktisch absolut Notwendige, oder darüber hinaus auch noch eine gewisse Repräsentation berücksichtigt. Wer sein Anlagekapital durch den Betrieb verzinsen und amortisieren will, wird sein Bienenhaus mit einfachen Mitteln aufstellen und einrichten. Wer aber über grosse Mittel verfügt und sein Bienenhaus gerne als Schmuckstück haben möchte, der darf nicht das ganze Anlagekapital in Berechnung ziehen, sondern muss einen Teil davon à fond perdu abschreiben. Unerlässlich sind in beiden Fällen einwandfreie Bienenkasten und ein Minimum an praktischen Werkzeugen. Wohl der wichtigste Posten ist aber das Bienenmaterial. Es ist aus der nächsten Umgebung zu beschaffen, am besten von einem befreundeten Bienenzüchter, der Rassenzucht treibt. Schliesslich ist auch der Arbeitsaufwand einzubeziehen, der natürlich von der Arbeitsweise des Imkers abhängig ist und sehr verschieden sein kann.

Der Ertrag eines Bienenbetriebes hängt vorerst vom Klima und der Güte des Trachtgebietes ab. Der richtige Standort ist eine wichtige Vorbedingung. Wohl fast ebenso wichtig ist aber die Arbeitsweise des Imkers, von der die Einsatzbereitschaft der Völker abhängig ist. Aber auch der beste Standort und die planmässigste Arbeit des Imkers können den Ertrag nicht sichern, wenn die momentane Witterung ungünstig ist. Soll die Ertragsberechnung ein richtiges Bild geben, so muss sie also immer ein Mittelwert sein aus einer längern Reihe von Rechnungsjahren. In Berechnung kommen natürlich nur die direkten Erträge an Honig, Wachs, Schwärmen und verkauftem oder selber verwertetem Zuchtmaterial.

Einen mehr ethischen Ertrag, der sicher auch nicht von der Hand zu weisen ist, führt Peter Jakob an, wenn er seinen jungen Kollegen sagt: „Während man sich mit den Bienen beschäftigt, hockt man nicht im Wirtshaus beim Kartenspiel und Bier, ist nicht auf jedem Tanzboden zu treffen, streicht nicht den Meitschine nach, spart also die Batzen und hat doch seine Kurzweil."

Eine ganze Reihe sorgfältig geführter Buchhaltungen über Bienenbetriebe zeigt, dass die Bienenhaltung rentiert und ganz besonders dort wertvoll ist, wo der Bienenzüchter als Landwirt auch den indirekten Ertrag durch die Blütenbefruchtung einbeziehen kann.

Der Honigabsatz litt immer unter der Konkurrenz der fremden Produkte, die trotz des hohen Einfuhrzolles 50% billiger abgegeben werden können als der inländische Honig. Der Wertausgleich liegt aber in der Qualität des einheimischen Produktes und der Garantie für seine Echtheit. Da wo der Konsument über die Vorzüge unseres Bienenhonigs orientiert wird, braucht uns der Honigabsatz keine Sorgen zu machen. Wenn wir aber nach einem guten Jahr einige volle Kessel beiseite stellen müssen, so ist das kein Unglück, denn im folgenden Jahr ist man sicher froh über diese Reserve.

Der Verkauf oder die Verwertung des anfallenden Wachses bietet keine Schwierigkeiten, da der grösste Teil von den Bienenbetrieben selber wieder verwendet wird.

Auch Schwärme und Zuchtprodukte sind meist leicht abzusetzen, wenn dies durch die Zuchtgruppen organisiert wird.

Dank und Ausblick

Die bernische Bienenzucht hatte das Glück, immer wieder führende Persönlichkeiten zu finden, die, als Förderer der Wissenschaft und Praxis, der Imkerei Weg und Ziel wiesen.

Neben den schon erwähnten Gründern des Vereins sind wir den folgenden Männern zu Dank verpflichtet:

Dr. h. c. Fritz Leuenberger, Lehrer, Bern, der durch seine wissenschaftlichen Forschungen und Schriften nicht nur dem engern Kreise diente, sondern weit über die Grenzen unseres Landes hinaus anerkannt wurde;

Dr. Otto Morgenthaler, der als wissenschaftlicher Leiter der Bienenabteilung Liebefeld sich hohe Verdienste um die Bekämpfung der Bienenseuchen erwarb;

Hans Masshard, Lehrer, Bern, der mit seinen Schriften „Praktische Bienenzucht" und „Königinzucht" die Arbeit des Imkers anregte und lenkte.

Alfred Lehmann, Bern, der durch seine administrativen Arbeiten und den Verkehr mit den Behörden der Bienenzucht grosse Dienste leistete.

Aber auch der vielen Kursleiter und Vereinsvorstände möchten wir gedenken, die in unendlicher Kleinarbeit immer wieder zur Förderung der Bildungsarbeit in der Bienenzucht beitrugen. Aber die Entwicklung steht nicht still. Schon zeichnen sich neue Aufgaben ab, wie die gesetzliche Ordnung einer umfassenden Bekämpfung der Bienenseuchen, der Ausbau des Versicherungswesens, die Errichtung von Lehrbienenständen in den verschiedenen Trachtgebieten, die Lenkung der Wanderbienenzucht und die Schaffung eines Zentrums für die Ausbildung der Kursleiter und Referenten. Wir hoffen, dass sich im zweiten Jahrhundert vieles verwirklichen lässt und wünschen, dass unter dem Schutze der Behörden, der OGG und der vielen treuen Mitarbeiter unter den Imkern die Bienenzucht im Kanton Bern auch in den kommenden Jahrzehnten wachsen und gedeihen möge.

Ehrenmitglieder

Herr *Buri, Dewet*, Ständerat, Etzelkofen.
Frau *Daepp-Riem, Marie*, Erlacherhof, Wichtrach.
Herr *Howald, O.*, Professor Dr., Stäblistrasse 19, Brugg AG.
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Herr *Schmutz, R.*, alt Nationalrat, Landwirt, Oberbalm.
Herr *Stähli, Hans*, alt Nationalrat, Bern.
Herr *von Steiger, Ed.*, alt Bundesrat, Muristrasse 22, Bern († 10. Februar 1962).
Herr *Wahlen, F. T.*, Dr., Bundesrat, Humboldtstrasse 39, Bern.

Bestand der Direktion, des Vorstandes und der Subkommissionen pro 1961/62

A. Direktion

*Herr *Gerber-Marti, Fritz*, Ing.-Agr., Hardhof, Schüpfen BE, Präsident.
Herr *Buri, Dewet*, Regierungsrat, Herrengasse 1, Bern.
*Herr *Bikle, Arnold*, Redaktor, Rüfenacht bei Bern, Sekretär.
Herr *Daepp, Manfred*, alt Grossrat, Landwirt, Wichtrach, Vizepräsident.
Herr *Glaser, Georg*, alt Direktor, Münsingen.
*Herr *Guggisberg, Ernst*, Gemeindeschreiber, Zimmerwald, Kassier.
Herr *Schmutz, Rudolf*, alt Nationalrat, Landwirt, Oberbalm.
(Die mit * bezeichneten Herren bilden das Büro.)

B. Vorstand

Herr *Gerber-Marti, Fritz*, Ing.-Agr., Hardhof, Schüpfen BE, Präsident.
Herr *Althaus, E.*, Landwirt, Rüderswil.
Herr *Arni, Herm.*, Grossrat und Landwirt, Bangerten b. Dieterswil.
Herr *Bernhard, Gottl.*, Landwirt, Holzmühle, Hindelbank.
Herr *Bikle, A.*, Redaktor, Rüfenacht bei Bern, Sekretär.
Herr *Buri, Dewet*, Regierungsrat, Bern.
Herr *Daepp, M.*, alt Grossrat, Landwirt, Wichtrach, Vizepräsident.
M. *Fleury, P.*, propriétaire, Beaupré, Porrentruy.
Herr *Gammeter, H.*, Direktor, Bergbauernschule Hondrich.
Herr *Gfeller, H.*, Nationalrat und Landwirtschaftslehrer, Oppligen.
Herr *Glaser, G.*, alt Direktor, Münsingen.
Herr *Gnägi, Rudolf*, Regierungsrat, Bern.
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