



2nd Workshop

Development of organic livestock farming: potential and limitations of husbandry practice to secure animal health, welfare and food quality

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Collection of abstracts

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State of the Art and Future Challenges: Organic livestock production and food quality

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Quality of organic food can be divided into process quality and product quality. This paper discusses both these aspects of organic food quality from the farm perspective. The basic ideas and aims of organic livestock production are covered, with a special emphasis on their impact on these two qualities of food. For instance, the basic principle of outdoor access and loose housing systems has an impact on both process and product quality by potentially improving animal health and welfare and promoting 'naturalness' in the process and by potentially changing and/or improving sensory and nutritional qualities of the product and increasing risk of contamination or contact with zoonotic pathogens. Current understanding of the impact of organic livestock husbandry on the two types of food quality are reviewed in the light of some examples. Future challenges and research needs are outlined.

Animal, welfare and health problem areas from an organic farmers' point of view

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Status Quo Analysis animal health

In Germany, the status quo for the different animal species has been analysed in the "Federal Program Organic Farming" - an initiative by the Ministry of Consumer Protection, Agriculture and Nutrition. All come to the same important conclusion: The main problems in animal health in organic farming are deficiencies in management, transformation of rules and knowledge transfer. Only a few problems result from areas that need new research (e.g. animal nutrition with organic feedstuff). The main health problems are bad hygiene status for all animals, mastitis, ketosis (metabolic diseases), lameness diseases for dairy cows, parasites and piglet coli losts for pigs, parasites for sheep and suckler cows and feather picking, cannibalism and parasites for poultry.

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What are the reasons for this?

The specialisation of the farmers is sometimes not very high as should be expected in organic systems. On the other hand, the demand for high quality products increases more and more which makes specialisation necessary.

The advisory system in organic farming is specialised only in a few cases—we have many all-round consultants. Only very few advisors are able to solve specific problems on a farm. Organic animal farms, especially dairy and pig farms, are under enormous economic pressure because of the low prices for milk and pork (and sometimes eggs). Most of the farms do not achieve adequate returns and destroy the farms capital reserves. There is not enough investments in buildings, and the farmers' workload is almost too high to bare. As a consequence there are some husbandry problems in buildings in the marginal areas of EC regulation 2092/91 and many farmers make use of the transition period until 2010.

What Bioland does in animal health improvement?

Some advisors from Bioland focus on nutrition and husbandry management which are the main reasons for a high incidence of diseases. It is planned to improve this Bioland advisory system with more specialisation and to extend it to all of the German counties. Every year a conference (2 to 3 days) is organised as a forum for discussion of the actual situation, developments and perspectives for each species (poultry, pigs, beekeeping, in future dairy).

The Bioland Standards include since 1994 a list of forbidden active substances and groups of active substances. To help implement these standards guidelines for animal health "Leitfaden zur Tiergesundheit" have been published. For the telephone and mail consultancy we have a contract with three veterinarians, who can be reached indirectly (over the advisers) by all Bioland-farmers. For advisors and inspectors we have produced a complete list of veterinarian products that are on the market, which is updated every 6 months. Bioland aims to work closely with the inspection bodies and also improve the training that the inspectors received, but private inspection bodies do not all work to the same higher standard.

Outlook

In organic animal husbandry we need product quality (not residues and pollutants, no zoonotic germs, best sensoric taste) and process quality (integration of the production on farms, limited emissions out of the system, high animal welfare standard, good animal health standard, high traceability and transparency) at the highest level. The main task for a farmers' organisation like Bioland is to improve the transfer of specialist knowledge on the farms. The main problem for the organic animal farms appears to be the lack of economic success, which breaks the effort. How to solve this would and should be subject of another workshop!

The concepts of animal health and naturalness of animals among organic farmers and experts in the Netherlands

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Copies of the abstracts will be available at the session.

A Veterinarians Perspective of Animal Health Problems on Organic Farms

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Organic Standards encourage "positive health" and restrict or prohibit certain conventional measures of disease prevention. In this paper mastitis control and fertility problems in dairy cows, and trace element problems and worm control in sheep are used as examples of a way to manage health within organic standards.

Mastitis control

Disease control (including mastitis control) is encouraged by using appropriate breeds, optimising, not maximising yields and feeding a diet which promotes rumen health (e.g. min 60% forage). Preventive antibiotic dry cow therapy is prohibited. In an example herd, excellent mastitis and cell count levels are achieved by using Swedish Red, Ayrshire or Brown Swiss crosses, yielding about 7000l and are solely fed on grass/grass silage and cake in the parlour. Excellent stockmanship and early detection of abnormalities in individual animals are key factors in disease control. The buildings including cubicles, are 40 years old and of suboptimal dimensions, but levels of mastitis as well as lameness remain low. A non antibiotic teat sealant has practically eliminated mastitis in the dry period. Due to the low uses of antibiotics, the success rate of treatments is high in comparison with many conventional herds.

Fertility

At the time of turnout to pasture annual fertility problems occur in many dairy herds, often due to protein/energy imbalances. Again, moderate yields, suitable breeds and high level of stockmanship lead to good fertility parameters, especially a high rate of positive pregnancy diagnoses. The vast majority of "non bullers" are treated with homoeopathy.

Trace element problems and worm control in sheep

Some sheep farmers (organic as well as non-organic) have their animals monitored for trace elements on a regular basis. Ewes in mid pregnancy which are not on concentrates are the main target animals for blood sampling, lambs can be sampled as well. The value of blood copper is under discussion.

As for worm control, clean grazing programmes, mixed/alternate grazing and low to moderate stocking densities are encouraged to replace routine use of wormers. Most organic sheep producers, however, worm ewes at lambing to prevent pasture contamination and infection of the lambs. Ideally, every worming treatment should be carried out after the necessity has been demonstrated in faecal egg counts. This is encouraged even in conventional flocks in order to save costs and to prevent wormer resistance. Limitations of this approach are certain species where disease is caused by larvae or early stages (Nematodirus, fluke). Rapid rise soon after sampling due to unusual weather conditions can also cause a breakdown. Recent UK recommendations for worm control in conventional flocks to prevent wormer resistance are an acknowledgement of organic principles.

Feeding strategies in Swiss organic farming to improve food quality and animal health

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BIO SUISSE Regulations state: animals must be feed appropriate to the species, and the feeding of the animals should not compete to human food resources.

Mainly the first regulation-point provides the basis for all the following provisions in relation to the feeding of animals in organic farming. BIO-SUISSE, the umbrella organisation of nearly all organic farmers in Switzerland, has stricter standards in relation to animal diet than the federal government regulation (Bioverordnung des Bundes). For example, since 1st January 2004 BIO SUISSE-farmers have to feed a 90 % of the annual dry matter intake of ruminants as forage.

The aim of BIO SUISSE's additional standards is to improve the quality of the animal products and the animal health. The consumers of organic products want high quality and safety food. To produce a high quality its necessary to consider the animal demands and their physiological conditions. Ruminants should be mainly feed with forage, which is although the way to realize the second point of standards, no competition to human food resources.

Several studies point out, that there's a difference in milk and meat quality between ruminants kept with or without access to pasture and between those fed a high or low amount of concentrate. The studies point out, that the CLA's (conjugated linoleic acids) and the long-chain n-3 fatty acids increase with feeding of roughage, especially green forage.

The diet is one of the most significant factors for animal health. The development to feed ruminants especially cows with a diet low in fibre, bring out a variety of diseases caused by the feeding strategies that are not appropriate to the species and the pressure to perform. The cows should keep their vested calling, to be a perfectionist in utilization inferior fibre substances to form high-grade proteins and fats. The cultural importance of the cows depends on the possibility of using this ability by man.

In fact of the physiological basic of ruminants, there does not even seem to be not even a economical reason why one should feed concentrates instead of forage to ruminants. Because of the high prices of concentrates, the forage has always played an important role in the Swiss agriculture. However, are also tendencies in falling prices for milk, milk-products and the cereals. Organic products could only compare on the basis of their quality and not on price. This corresponds with the Swiss Government Regulation for Organic Farming, which enshrines that the feeding contributes to produce quality, not quantity.

Control of Gastrointestinal Nematodes in Organic Beef Cattle through Grazing Management

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The risk for obtaining relevant infections with gastrointestinal nematodes (GIN) was assessed in 36 organic beef cattle herds in Switzerland based on a questionnaire. The analysis included epidemiological factors, such as stocking rate, separate grazing of first- and second-season cattle, altitude of pastures, overnight housing and others. It resulted in classification of every farm to one of the five risk categories (A-E). 24 farms were allocated to the low risk categories D and E. This classification was largely confirmed by the coprological results obtained in late summer. Only in seven farms the mean egg excretion exceeded the tolerable limit (150 eggs per gram of faeces). Two thirds of the farmers grazed their young stock (> 12 month) separately from the older animals. On 50% of these cases both groups shared the same pastures alternately. On the other farms the younger cattle were rotated almost exclusively on their own pastures. Higher egg excretion was mainly observed in these groups. In the second year the study was continued in those 7 farms that had unsatisfactory results from the previous year or in which gastrointestinal nematodiasis was suspected despite low egg counts (3 farms).

The proposed changes in grazing management (alternate or mixed grazing of young and older stock) were successfully adopted in 8 of the 10 selected farms. For various reasons, partly due to temporarily dry conditions the other 2 farmers were forced to continue with separate grazing of the young stock. In those 2 farms calves had to be treated once with anthelmintics due to diarrhoea, poor body condition and elevated trichostrongyle egg excretion in mid summer. After treatment the health status of the calves improved substantially. On farms that adopted the proposed strategies, the mean faecal GIN egg counts remained on a low level (60 e.p.g.) during the entire grazing season, and use of anthelmintics was not necessary. This stood in contrast to the results from the previous year, where the mean egg counts exceeded 200 e.p.g., and anthelmintic treatments were necessary in the majority of the farms. The substantial reduction in parasite egg excretion and the improved development of the young stock must be largely contributed to the changes in grazing management, but to a smaller extent the temporarily dry conditions will also have negatively affected the infection risk with GIN.

Nutritional aspects of bioactive forages for worm control in organic sheep and goats

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Due to the constant development of resistant strains of gastrointestinal nematodes to broad spectrum anthelmintics (AHs) and to the increasing demand of consumers for reducing the use of chemicals in animal products, there has been a growing interest in recent years to seek alternative, sustainable methods to control gastrointestinal trichostrongyles in domestic ruminants. Among the currently investigated options, the consumption of some bioactive plants, presenting negative effects on parasite population, seem to represent a solution compatible with the organic farming principles. The first evidence on the AH properties of such plants has been acquired on **naturally infected** sheep. These initial results indicated that grazing on some legume forages, such as *Hedysarium coronarium*, *Onobrychis viciifolia*, *Lotus pedunculatus* or *L. corniculatus*, which contained moderate to high concentrations of tannins (plant secondary metabolites, PSM), resulted in less severe parasitic infections. Similar conclusions were obtained in goats grazing *Lespedeza serecea*, a plant high in condensed tannins. In most cases, these consequences on nematode infections were accompanied by improved performances of the hosts. **Two main mechanisms** have been proposed to explain these consequences. The first hypothesis supports the view that some PSM, and particularly tannins, may have direct AH properties. On the other hand, the benefits of tanniferous plant consumption could also be related to indirect effects of tannins by increasing the flow of digestible proteins in the small intestine of the parasitized host. This process is recognised as a mean to improve the host resilience and resistance. The AH properties of tannins were further explored **in experimentally infected** sheep and goats, against the main parasite species encountered in farm conditions and using quebracho as a source of tannins. The administration of such tannin drenches was repeatedly related to changes on larvae establishment, female fertility, and number of adult worms. However, these studies also underlined that several factors contribute to modulate the effects of tannins on worm biology. Under similar conditions of infections, differences were noticed between sheep and goats. The effects of tannins were also variable against the different parasite species and/or stages. Last, in sheep, it was shown that the action of tannins against nematodes was dose related. These 2 last findings were confirmed through **in vitro studies**, aiming at measuring the effects of various plant extracts on different parasitic stages and species. Such studies enabled to screen the anthelmintic properties of various extracts from tanniferous plants, either legume forages, aromatic or woody plants which can be consumed by small ruminants in grazing or browsing conditions. In some cases, these in vitro results strongly supported the hypothesis of direct AH properties of tannins on nematodes. In the majority of cases, tannin containing extracts were tested against nematode models but a potential AH role for other PSM can not be rejected. Although the mechanisms for the observed effects of tanniferous plants remain unidentified, some studies have explored yet **different modes of application** for these plants in farm conditions.

The advantages associated with the incorporation of “anthelmintic pastures” in the grazing systems have received much attention. However, some studies have also illustrated the repercussions derived from the regular distribution of hay from legume forages. Last, because woody plants and bushes are tannin rich, the possible benefits related to the exploitation of rangelands have also been underlined. **Some limits** in the use of bioactive plants have been identified. Agronomical considerations oblige to choose the most adapted plant to various environmental conditions encountered. As the majority of such PSM have also been known for their anti-nutritional properties when consumed in excessive amounts, the balance between the positive effects of PSM in infected animals and their potential negative consequences on host physiology needs to be clearly defined. There is also a need to better understand the mechanisms of action of these compounds against nematodes and identify why the evidence on the AH properties of PSM is often contradictory. Nevertheless, the results accumulated since a decade on these interactions between tanniferous plants and infected ruminants have represented one of the most promising option to reduce the reliance on chemotherapy and to achieve a sustainable control of gastrointestinal nematodes both in conventional and organic farming systems.

Bulk Milk Somatic Cell Count, Barn Type and the Role of Case Studies

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Mastitis, either subclinical or clinical is one of the major problems in organic dairy farming. Because of welfare concerns the deep litter barn is highly preferred due to laying comfort, free access and natural herd behaviour. However, bulk milk somatic cell counts (BMSCC) are generally higher in deep litter barns. In this paper, several studies on risk factors for too high SCC were analysed and their results were combined. These studies showed that BMSCC in deep litter barns can be handled in an acceptable way and that risk factors can be solved. A preliminary conclusion about the overall factor causing too high SCC was the restrictive use of antibiotics both for clinical cases and for dry cow therapy. This was affected by blood group (biodynamic vs ecological) in combination with the early timing of conversion of farmers, showing differences in inner motivation and experiences of the farmers. Case studies and the method of ‘pattern recognition’ should be used in future research after the development of a non-antibiotics policy to improve too high levels of SCC.

The relationship between worm burden and milk quality of goats

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Effects of subclinical parasitism on productivity parameters like milk yield and fat have been described previously in cows. Until now only few data were reported for goats and ewes. Two main topics of the institute's research focus on milking of small ruminants and strategies to reduce anthelmintic treatments.

In 2003, 45 goats and 19 sheep were monitored during lactation. Milk yield and milk composition (fat, protein, lactose) were recorded monthly. Every two weeks, samples for cyto-bacteriological analysis were gained of each half of the udder. At the end of April the grazing season started and individual faecal samples were collected monthly. In September a part of the goats showed signs of clinical parasitism and a deworming was carried out. The ewes were infected only at low level and had a very stable udder health. Thus, they were excluded from the analyses.

A first data evaluation showed no significant relationship between the severity of the infection with gastro-intestinal-nematodes (GIN), estimated by the number of eggs counted in the faeces (FEC), and milk yield and milk quality.

In a second step, animals were grouped according to the course of infection in "mild" and "serious". "Mild" means that an FEC over 300 Epg was only registered at the end of the investigation period in August. Compared with the "mild" group, the FEC of animals with "serious" infection courses immediately increased after the beginning of grazing. The new analyses revealed differences between these groups for the content of lactose and protein, even if they were not statistically significant.

During mid of July and August, when the prevalence of GIN was highest, the group with the "mild" course of infection showed a lower decrease of milk production compared with the higher infected group.

However, further research is needed to evaluate, and maybe confirm our observations that the course of infection with GIN might be an interesting parameter to express the resistance to parasitic diseases in goats and might be related to the parameters of milk production and composition.

Alternative calf rearing system for organic dairy farms

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Maternal behaviour and contact between cow and calf is limited or absent in modern dairy systems due to the wide use of artificial rearing. This is true also in organic dairy systems. An increasing number of individual farmers are not satisfied with the artificial bucket feeding system. According to some farmers this system leads to poor immunisation and diarrhoea in calves, and high somatic cell counts and poor development of social behaviour. Farmers also find it hard to explain their calf rearing practices to critical consumers who support the development of sustainable farming. Suckling as a rearing system for dairy calves has a potential, however, suckling systems, can also be in conflict with measures to secure food quality. Calves are separated immediately after birth from their mothers to prevent the contact with manure and the possible contaminations with pathogens which cause e.g. Johne's disease.

In a pilot study starting in 2002, researchers of the Louis Bolk Institute together with farmers studied the effect of suckling on several aspects of the farming system, including calf growth, animal health, milk production, rearing costs, behaviour, animal welfare and naturalness. The aim is to develop an alternative calf rearing system that will improve animal welfare on dairy farms which at the same time meets standards of farmers in terms of practicality and cost.

In the first year the emphasis of the study was on calf growth, milk production and disease control. Calf milk consumption was 10 kg/calf/day in the first 14 days using a single suckling method with additional milking. From 14 days to 2 months of age the average milk consumption was 15 kg/calf/day. In the pre-weaning period suckling calves showed higher growth compared to bucket-fed calves. During the suckling period the cows are also milked twice a day, their individual milk production showed large variation over days, animals and farms. At the first farm cows produced in the first 14 days of the lactation on average 10 kg per day, at the second farm in the first 60 days on average 24 kg of milk in 2002. In 2003 the focus continued to be on live weight development of calves. On top of that behavioural studies on calves before and after weaning were carried out. Results on long term effects of suckling on cow and calf are still to be determined. Farmers continuously adjust the system to their specific circumstances and needs. In this way different suckling methods are tested for their potential and limitations in practice.

Effects of pasture on animal health, welfare and performances of organic beef reared in Tuscany

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In Tuscany, as in the whole Mediterranean area, pastures produce grass only in limited periods (spring and autumn) and beef cattle from 6-8 to 18-20 months are traditionally reared in boxes within stables. This fact is an obstacle to the complete application of the EC Regulation No 1804/1999. The majority of organic farms make use of the derogation under point 8.5.1. of the above mentioned regulation and farmers have to present arrangement plans to their control bodies by December 2010. The challenge is to change farmers' attitude and to show that fattening organic beef cattle at the pasture is possible and profitable, also in these climatic conditions.

The research was carried out on the farm of Valdastra, in the Commune of Borgo San Lorenzo, in the Mugello area. The aim was to compare welfare, health and performances of 16 Limousines males reared after the weaning: half on pasture from 9 to 3 months before slaughtering and half in boxes within the stable from 9 months to slaughtering.

In the whole research period, November 2002/ November 2003, temperature and rainfall were registered. All components of the feed ration were organic, and the forage/concentrate ratio (60/40) was respected. The welfare of the two experimental groups was investigated using the avoidance distance method. Through the whole experimental period, the health status of the two groups was evaluated, and homeopathic treatments were registered. Each month, we measured and weighed all the animals to evaluate the body development. At the slaughtering, all the carcasses were photographed, weighed, measured and evaluated (EUROP method). A meat sample (steak between the 5th and 6th rib) from each animal was submitted to physical analysis. Finally, the optimal organic beef housing in Tuscany was described, and economic cost was evaluated.

Live, slaughtering and physical meat analysis data were analysed with ANOVA. The live data, withers height, pelvis height, body length, rump length (pasture>stable) and hips width (pasture<stable) were influenced by the housing, and only rump length by the housing x time. The animals on pasture were well conformed and preferred by the farmer and the butcher. Of the carcass characteristics and meat physical analysis, only the fatness score (pasture<stable) was influenced by the different housing. All the carcasses and meat samples of both groups showed very good quality parameters. In relation to the health status, we did not register any problem through the experimental period. The measures of avoidance distance did not prove to be helpful to assess the welfare, maybe because the animals housed in the stable were more accustomed to be handled than the animal at the pasture, and we could not find any difference between the two groups. However, stress problems for the animals could rise when they are moved in the stable in the last 3 months before slaughtering, as allowed by the EC Regulation No 1804/1999 (paragraph 8.3.4). In order to reduce this stress we suggest a new rearing modular structure that allows reducing the given space for the animals without change both the social group and the life environment in the last period before slaughtering.

Proposed husbandry practices to ensure animal health and product quality in organic sheep and goat production systems

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Sheep and goat production systems, with emphasis on milk, are of major importance to southern European countries and are particularly favoured in Greece's geographic and climatic characteristics. Greece has a long tradition in sheep and goat production as well as the highest number of such animals per capita in Europe with about 9.3 million sheep and 5.3 million goats. Before assessing the possibilities for novel approaches regarding husbandry practices suitable for organic systems, it is necessary to understand the particularities of the structure of sheep and goat enterprises in Greece. The dominant system of production, accounting for about 82% of the national flock, is described as semi-extensive; animal feeding is based on grazing on natural pastures, whereas housing and additional feeding is provided during the winter months. The wide range of flock size and associated differences in management practices has significant influence on the options for change. However, we see the introduction of organic systems as major development and we believe that the present rapid growth of such systems will continue and will soon become a significant part of the small ruminant sector in Greece. Furthermore, several principles of organic farming are already present in the current semi-extensive systems that prevail small ruminant production in Greece. Our aim here is to provide a sound basis for veterinary practitioners and organic farmers regarding the principles and techniques of good husbandry in organic sheep and goat systems in Greece. Hence, the role of husbandry practices in the management of animal health and their effect on product quality is considered. The notion is that a comprehensive understanding of the particularities of different sheep and goat systems across Europe is a prerequisite for integrating the knowledge and skills required to provide a high quality health management under organic standards. Sheep and goat farmers seek animals with good productivity in terms of milk yield and meat production as well as good health, resistance to diseases, reproductive efficiency and good conformation. Therefore, evaluating the importance of local breeds, breeding for disease resistance, preventive veterinary medicine with early disease diagnosis and use of alternative medical treatments becomes a challenging task, since all the above-mentioned characteristics must be combined. We put forward proposals of sound husbandry practices, which can improve the efficiency of organic dairy sheep and goats by using knowledge of nutrition, reproduction and genetics while considering the welfare needs of the animals and ensuring the high product quality at farm level. The paper ends with a look into the future of organic sheep and goat production in Greece and describes its potential under the characteristic Mediterranean environment.

Production effects of different systems of environmentally friendly grazing of fat heifers in the Carpathians

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This study on effects of different grazing systems on pasture yield and animal production was conducted in the West Carpathians from 1986 to 1998 (Male Pieniny, 800-850 m asl.).

Red Polish heifers with an initial weight of 190-230 kg were used. At the start the stocking rate was relatively low, 1.5-1.6 DJP or 750-800 kg·ha⁻¹. Four adjacent pastures were delimited; two of them for rotational grazing and the other two for uncontrolled one. The objects of each pair were differentiated with the procedure of pasture topping (employed or not). The experimental heifers were maintained non-stop on the pastures and for night they were kept in portable hurdles. The grasslands were not fertilized, so the only pasture-yield affecting factor was fresh manure applied to the ground by the hurdled animals. For a whole grazing season e.g. 115-130 days the heifers fed on pasture greens only. They were supplied with water and minerals.

Animal production and pasture yielding data were collected respectively according to animal or grassland science standards. Finally, the average values for the whole 13-year period were calculated. It has been found out that at the initial stocking rate with non-intensive pasturing animal production varied from 248 to 323 kg·ha⁻¹. Higher results were noted for controlled grazing (266-323 kg·ha⁻¹), and lower ones for uncontrolled one (238-255 kg·ha⁻¹). The rotational system guaranteed upper intakes of green biomass (about 0.8-1.1 t·ha⁻¹ DM over the uncontrolled) and increased pasture yield even without artificial fertilization. Owing to that, in long-term period crop production from the pasture amounted to 5.0-6.0 t·ha⁻¹ DM.

Organic broilers in the Netherlands

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Organic broiler husbandry is developing in the Netherlands. At the moment two groups of about seven farmers each are active. The aim of this study was to gather all available knowledge on organic broiler husbandry and to identify problems, together with the Dutch organic poultry farmers. To meet this aim, questions regarding the ideal management (including food safety), the ideal housing design, and the best type of bird for these systems have to be answered. To answer these questions, on-farm research was initiated on food safety aspects, and knowledge on organic broiler husbandry was gathered through an inquiry, a desk study and a visit to organic broiler systems in the United Kingdom.

The food safety aspects were studied by means of sampling for Salmonella and Campylobacter in combination with an inquiry on organic farms. The incidence of Salmonella was measured in the clean stable (before the birds were introduced), at five weeks of age (before the birds gained access to the outdoor run), and at 10 weeks of age. At slaughter, the caeca content of 30 birds, one breast skin and 25 g of poultry meat product were gathered from each flock for analysis. To assess the incidence of Campylobacter, ten samples were taken from the manure originating from the caeca (dark colour) at two, five, and 10 weeks of age. By means of the inquiry, the desk study, and the visit to the United Kingdom information was gathered on animal husbandry aspects of organic broiler production, helping us to identify possible problems and to indicate possible ways to solve these problems.

In the food safety research, the results of many flocks were incomplete and the number of flocks was limited due to the outbreak of avian influenza in the Netherlands. In total 31 flocks were sampled. Four out of 31 flocks were positive for Salmonella (13%). Eleven out of 31 flocks were positive for Campylobacter (35%). In two of these eleven flocks, no Campylobacter was found in the samples at 10 weeks of age. Our preliminary results showed that the incidence of Salmonella was low on organic broiler farms, whereas the incidence of Campylobacter was higher, in line with previous studies. In the animal husbandry research, several problems and possible ways to solve these problems were identified, regarding prevention of coccidiosis, 100% organic diet, mobile housing, design of the outdoor run, and the comparison of different slow growing breeds. Together with the Dutch broiler farmers it was decided to focus our research in 2004 on food safety and on the feasibility of a 100% organic diet.

Health in free-range chickens - facts and fairy tales

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Because of the outbreak of Avian Influenza in the Netherlands (March-August 2003) there was a need for clear information about the importance and risks of a free-range area for poultry and how we keep these risks to a minimum. The aim of this study (methods: literature and interviews) was to inform farmers, researchers and policymakers about how to ensure that organic and free-range farming practice are as healthy (for chickens) and as safe (for humans) as possible.

Why should we give poultry an outdoor run?

Sometimes the importance of being outdoors seems to be underestimated, even in the organic sector. However, several studies showed a significant relationship between the use of an outdoor run and feather pecking (indicator for degree of welfare).

How healthy are organic chickens and do they have more resistance against diseases than chickens kept indoor?

Compared with batteries, a higher mortality is seen in outdoor poultry (resp 5 and 15%), as well as higher use of medicines. In general, average mortality in the smaller flocks (<700 hens) is well below 10%. If the mortality is above 20% this is often caused by cannibalism. Apart from cannibalism, there is no information available about what exactly causes mortality in free-range poultry. Disease problems mentioned for outdoor hens are internal parasites, E. coli, gut problems (*Brachyspira* spp) and infectious bronchitis. One can question whether battery hens with weak bones, severe fatty liver syndromes, claw injuries and bad welfare (but still with low mortality and good production) are in good health. However, a mean of 15% mortality in free-range systems clearly is not a sign of good health either. In order to improve the health of free-range hens one should compare farms within the one system and look at housing and management during rearing as well. There are examples of organic farms performing well, thus it is not the system as such that causes problems. Rather underestimated is the risk of dioxine, especially in organic eggs, even when fed 'clean' food and kept in a 'clean' outdoor run. During the meeting this will be discussed in more detail.

Can we stimulate resistance through breeding, housing and management?

Breeding for general disease resistance is possible, but has not been practiced because during the last decades hens were kept indoors and vaccinations were available. Moreover, we should look for possibilities in the field of developing the general immune system, for example by administering gut flora to one-day-chicks and keeping young hens in contact with (healthy) older hens, compost and a free-range area at young age as means of well-controlled contact with micro organisms (hygiene theory). Of course they should have possibilities to fulfil their behavioural needs, because good welfare is necessary for staying in good health.

Conclusions

There is a strong need to improve animal health in organic (and other free-range) poultry. Research focus on comparing different organic farms in order to identify the best farming practices. Moreover, according to the knowledge in the field of immunology, attention should be paid to the development of a good general immune system during the rearing period.

Protein supply for organic poultry: options and shortcomings

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Considering the principles of organic farming, one could expect that on organic farms, monogastric animals and especially poultry would play a different role than they do on specialized conventional ones. However, the rapid development of organic markets and the demand for poultry products have motivated a considerable number of organic farmers to focus on poultry production. Depending on the locational factors, it can be very difficult to incorporate poultry into the farm system. This is caused by several typical characteristics of our most important poultry species:

- Many poultry breeds utilized in organic farming have an extremely high genetic potential for primary performance traits. For laying hens, this is accompanied by a decreased feed intake as a result of conventional breeding programs.
- Poultry cannot easily utilize high-fibre feedstuffs. Therefore, they need feedstuffs with high digestible nutrient contents, which are usually not available in sufficient amounts on organic farms.
- Most plant proteins show an amino acid pattern that is quite different from the needs of the animals. This is especially the case for legume grains, which are typically an integral element of most organic crop rotations.

There is a difficulty of covering the nutritional needs of modern poultry breeds in organic farming. Most probably, this difficulty will even be aggravated if organic poultry has to be fed only on organic feedstuffs in the near future. The current lack of information about the amino acid supply from organic feedstuffs calls for immediate action in order to solve this problem. In general, it can be expected that high performing laying hens and young turkeys are most likely to be undersupplied with essential amino acids. This will not only depress performance but is probably an important factor related to feather pecking and cannibalism in organic layer flocks. The shortage of organic feedstuffs rich in limiting amino acids and the attempt to avoid the usage of conventional feedstuffs for organic livestock, encourages discussion about the (temporary?) use of synthetic amino acids in organic farming. This practice is currently not allowed in most European countries. However, possible long term-effects such as the use of even higher performing genetic strains and the accelerated change towards more intensive production systems have to be considered carefully.

The concept of broiler production adhered to in many European countries may serve as a classic example for a solution which is based on the interdependence of breeding and nutrition: Typically, the growth rate of organic broiler breeds is 30 to 50 % lower than in conventional broiler production. This leads to a considerably lower amino acid requirement, which can be more easily covered with organic diets.

If the growth of the organic poultry sector is to be sustained, feeding strategies have to be developed which avoid a substantial deficiency in essential amino acids without the use of conventional protein feedstuffs. This can only be attained by a combination of measures, including the identification of suitable feeds and their increased production, their inclusion in optimal diets which are formulated based on accurate information about their nutrient content and the use of genetic strains of well adapted birds which are able to cope with moderate amino acid imbalances.

How to motivate laying hens to use the hen run

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An important problem in free range husbandry of laying hens is the uneven use of the run. This leads to an overuse of pasture and an over fertilisation of soil near the hen house. In several studies we tried to determine management and structuring factors which may result in more hens in the run and a more even distribution of the animals.

In a first study with 4 groups of 50, 500 and 3000 laying hens the use of the run was compared with flock size. During the time the hen-runs were available to the laying hens, animals in smaller flocks used them more often, i.e. the use of the hen run decreased with increasing flock size. Most laying hens stayed in the first quarter near the stable. Even in the small flocks, only few laying hens used the most distant quarter of the hen-run. A further question was, if it is possible to improve the use of the run by scattering grains in the outdoor area during the rearing period (flock customisation). The experiment was done on 4 rearing farms with at least two groups of hens (test and control group). The test group received grains in the run, the control group got grains only in the bad weather run.

In the middle and in the end of the rearing period the number of animals in the run was not different with and without flock customisation. Furthermore, there was no difference in the distance to the poultry house between the animals of the 2 groups. However, some differences in the behaviour occurred. We suppose that with flock customisation food search activity increased but other factors than scattering grains have a bigger impact on the use of the free range. In a next step, the effect of roofed dust baths on the use of the hen run was tested experimentally. We had 4 groups of 500 laying hens, once with and once without roofed dust baths at the end of the hen run to structure the free range. We found no difference in the number of hens in the free range with and without structure but there was an influence on the distribution. When structures were located in the furthest quarter of the hen run, more hens were there than without structure. In the first quarter there were more hens without any structure in the hen run.

As even this small and distant structure had an effect on the distribution we tried to find out more about the preferences of hens for a certain kind and amount of structuring elements. Eight groups of 20 hens and a rooster had a hen run which was optically divided into two parts. Two experiments were done. First, one part of the hen run had a shelter in the size of 1% of the area. The other part had 5 such shelters. Second, the less structured part was supplemented with 4 different objects of the same size. These four objects were a perch on two levels, a pecking-tree (vertical trellis on a stake with hanging corks), a box with fir-cones for scratching and two small fir-trees. The other part stayed the same with 5 shelters.

In this choice experiment we could not find an influence of the amount of structures on the use of the hen run, but the hens preferred the part with various structures and they stayed evenly beside, under or on all different structures. This results show, that the quality and variation of structures influence the use of the hen run more than the amount of structures. Probably this is due to individual differences in the hens on what structures they are attracted by or they need different structures in different phases.

Animal Health in organic dairy farming – results from a survey in Germany

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Housing, feeding and management conditions in organic farming systems are supposed to be welfare friendly and beneficial to health; the role of preventive measures is especially emphasized. The aim of the present study was to determine the actual situation in German organic dairy farming with regard to lameness, mastitis and metabolic disorders and to investigate possible relationships with the specific housing conditions and the use of preventive measures.

In a first step, a questionnaire on housing, herd health management and disease incidences during the last 12 months was sent to 1000 randomly chosen organic dairy farms with a herd size greater than 15 cows. Out of the farms which had responded and agreed to be included in further studies, a cross-sectional study was carried out in a representative sample of 62 loose housed herds. The data presented here are from a subsample of 50 farms (mean herd size 53 cows), which kept either Holstein Friesian, Brown Swiss or Simmental cows and provided complete herd health records. The housing systems were either cubicle (n=39) or straw yard systems (n=11). In each farm, lameness was recorded using a 5-point locomotion scoring system and leg injuries were recorded taking size and severity of the lesions into account. Milk performance testing records and herd health records of the years 2001 and 2002 were copied and subsequently evaluated.

In the cross-sectional study, the average lameness prevalence was 18 % (2 – 53 %) with herds housed in cubicles showing significantly more lameness (20 %, sd 11,7) than herds on straw yard systems (10 %, sd 5,4; $p < 0.05$, Mann-Whitney). Mastitis incidence ranged between 0 and 101 % (mean 33 %). Interestingly, there was no obvious effect of several preventive measures such as teat disinfection on mastitis incidence.

These preliminary results demonstrate that production diseases such as lameness and mastitis play a considerable role in organic dairy farming in Germany and underline the need for integrated prevention strategies.

Development of an advisory system that supports good animal welfare in organic milk production in Norway

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One important objective of organic farming is ensuring the welfare of farm animals. The regulations for organic livestock husbandry themselves cannot guarantee the animals' health and welfare. What counts, is how the regulations are applied and how farmers in general treat their animals. It is expected that a broader range of farmers in Norway will convert to organic farming than earlier, from experienced, successful farmers to those who have been less fortunate, and want to try organic farming as a last chance. Organic livestock husbandry places different demands on the farmer than conventional and there are different risk factors involved. Thus, the dissemination of know-how aimed at the challenges inherent in organic farming methods are important in order to secure a high level of animal health and welfare. To meet this need for information and expertise, an advisory and development project "Good animal welfare in organic dairy farming" started in Norway in May 2003. The project's main goal is to develop and establish a permanent advisory service aimed at securing a high level of animal health and welfare in organic dairy farming. Secondary goals are:

1. Disseminate knowledge about organic livestock husbandry among experts working directly with livestock farmers (TINE Dairy advisers, veterinarians, etc.).
2. Develop and test an advisory system for use in organic dairy farming.
3. Develop and test a system of standards, assessment and documentation of animal health and welfare in organic dairy herds.
4. Develop information material and templates for group counselling and for training farm advisers.

The advisory system will be designed for organic dairy farmers, and will include visits by advisers to evaluate herd health and welfare, as well as advice on disease prevention and the improvement of animal welfare. On the first farm visit, the adviser and the farmer jointly consider the status of herd with the help of the welfare check lists and health reports of the herd records. Then, either directly during the visit, or afterwards, a plan for improving animal welfare is drawn up. On later visits, the implementation of new, or the revision or removal of existing welfare measures are evaluated on the basis of the developed plan. In addition, counselling meetings will be held with groups of farmers, production advisers, veterinarians and other advisers as a forum for discussions. Relevant topics of current interest may also be presented at the group meetings.

Expected results from the project:

- Check list for the assessment of animal health and welfare in organic dairy production.
- Template for a health and welfare plan for organic dairy farms.
- Information material and design of group counselling meetings in the field of animal health and welfare in organic dairy production.
- Course and information material adapted to the needs of advisers working with issues related to animal health and welfare in organic dairy production.
- Focus on animal health and welfare in publications and various press coverage.

Swiss Organic Dairy Farmer Survey: Which path has to be traced for the organic cow in the future?

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Organic farming in Switzerland is very well developed but still management, genetic and health problems persist among many dairy farms. In the summer of 2003 FiBL therefore carried out a survey of 1000 organic dairy farmers to find out where some of the remaining problems are situated and to develop idea what the organic cow of the future should look like.

Only as little as a quarter of all Swiss farms encounter no problems with their milking cows, i.e. more than 3 out of 4 farmers have problems with their herds. One third of farmers struggle with fertility troubles, 20 percent has problems with low milk production and quality, especially with the protein content of the milk and another 20 percent has mastitis problems.

The most important criteria for breeding in organic dairy farming in Switzerland nowadays are fertility, low cell count, very good milking production from forage, longevity and milk quality, especially protein content. The modern dairy cow for the organic sector must have a long productive lifespan, good milking performances with a good protein content requiring little or no concentrate and a low somatic cell count.

A lot of efforts have to be made to improve the genetic heritage of the dairy cows and their management has to be considered more widely, having an important influence on the wellbeing of the cows.

The ecological breeding index, introduced in Switzerland in the year 2000, ranks sires after quality evaluation of their off-springs regarding to functional and performance traits. This is an appreciated tool by farms working by artificial insemination. Almost 90% of the farms think that this index is helpful for the selection of the matching sires for their cows. However, a big problem remains that sires that score high according to their genetic performances for organic agriculture, come from conventional breeding strategies. It is time to develop a breeding strategy for cattle from an organic point of view, so that sires could be chosen from the organic genetic pool, but at the moment it is still difficult to find funding for this.

Organic conform udder health concepts – how to reduce therapies

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Annex 1 B, EC Regulation 1804/1999 and 2092/91:

„ 5.2 **The principles ... [Disease prevention in organic livestock production], should limit animal-health problems so that they can be controlled mainly by prevention**“

Both, consumer and legislative expect products from healthy organic livestock. In consequence, keeping farm animals healthy has the highest priority in veterinary work on organic farms. Different Swiss FiBL projects in mastitis of the last years were aimed in health concepts conform to organic livestock principles.

One project includes 20 Farms (with an average of 15 cows per farm) of a high mountain Swiss region mainly and places emphasis on milking hygiene, milking technology, mastitis treatment during lactation (homeopathy versus antibiotics) and dry-off treatment (homeopathy versus placebo and partially additional antibiotic). The overall result was a reduction of cows with a somatic cell count higher than 150'000/ml based on milk recording dates between January and May from 35% in 1998 to 17% in 2000. During the project the average number of treated mastitis cases per farm decreased from 10 to 4.

A second project considering farms in the north west of Switzerland was aimed at the implementation of an organic conform udder health concept placing emphasis on reduction of the use of antibiotics. In order to achieve this, it was envisaged that factors contributing to mastitis will consistently be eliminated or at least reduced by implementation of herd health management and, in addition, by the establishment of complementary therapy and prophylaxis in udder health in co-operation with the veterinarian. On the 3 pilot farms a reduction in the use of antibiotics from 70 treatments per 100 cow and year in 2000 (previous the start of the project) to 2 treatments per 100 cow and year in 2002 (second project year) could be shown. Thereby, the udder health status of the herds remained stable with round about 65% of cows with a somatic cell count lower than 100'000/ml.

The objective of the current project is the enlargement and implementation of the previous concept into practice. A project team of 5 veterinarians and 2 agronomists will collect data of mastitis causing factors on 100 new farms per year in Switzerland: housing, feeding, human-cow-interaction, milking technology, milking hygiene. These data will be connected to the mastitis status of the herd based on quarter milk samples and milk recording dates. During a period of at least 2, years these farms will be intensively advised by the project team and the practical veterinarian. Therapies will primarily based on homeopathic remedies. The development of mastitis causing factors and the mastitis status of the farms is followed up at regular intervals to show possible correlations between (changing) factors and mastitis status. In addition, an Internet based network of health data should be implemented for providing informations for farmers and veterinarians in herd health management.

Incorporation of existing animal welfare assessment techniques into organic certification and farming

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The organic certification system - as it is currently implemented in the EU Council Regulations (EEC) No 2092/91 and 1804/99 and as is the case with most other assurance schemes (e.g. RSPCA Freedom Food) - is based on assuring standards, which mainly describe resources such as stocking densities or provision of straw. While the organic system (e.g. prevention of disease by adequate husbandry and appropriate breeds, restricted use of chemically synthesised allopathic veterinary medicinal products or antibiotics for preventive treatments,) has been carefully chosen and designed over the years to guarantee various outcomes (e.g. increased immunity, improved animal welfare, minimisation of residues in meat/milk, reduced damage to natural flora and fauna), the certification system does not take any legal responsibility over the outcomes. However, the outcomes are an integral part of organic farming objectives and a major reason for continued consumer interest in organic products. While animal welfare is recognised as an important goal of organic production systems, there is a general acceptance that little evidence of improved animal welfare exists (Hovi *et al.*, 2003).

A DEFRA-funded development project has, for the past year, been incorporating existing welfare assessment techniques for cattle, pigs and laying hens (Whay *et al.*, 2003, Main *et al.*, 2003) into organic certification and farming. These protocols include objective animal-based assessments of a representative number of individual animals using parameters, such as body condition score, overgrown claws, injuries, cleanliness and behavioural observation, e.g. lameness scoring, rising restriction and flight distance. Furthermore, the herd is assessed for other signs of impaired welfare (e.g. coughing, skin irritation), and qualitative descriptors, such as the apparent opportunity for the animals to perform normal behaviours, the overall integrity, physical appearance and the mood of the herd. Finally, an assessment of the suitability of animals and stockmanship to the individual situation is made and medicine records and the health plan examined.

In addition, a web-based system was developed, linking together the data from assessment of medicine records, health plan and animal based observations. The system is capable of producing farm specific 'benchmarking' reports, comparing each measure to the outcomes on other farms. It also includes explanations of the significance of the findings, and links animal welfare assessment to organic standards and animal welfare regulations.

It is believed that the benefits of welfare assessment can be significant. For instance the results of welfare evaluation will educate farmers about their situation and compare it to similar farms, encouraging improvements. Intervention guidelines indicate specific welfare problems (e.g. lameness, feather damage) needing attention. Each problem can be dealt with individually within the health plan while veterinarians and advisors can use the results to give guidance on how to improve the situation. It is also believed that the assessment system provides a valuable tool for certification bodies and farmers to monitor and review their situation, which has the potential to shift the overall standard on organic farms towards higher welfare. Furthermore, the goal of organic farming to ensure high animal welfare (ACOS, 2003) can be transparently demonstrated to the public.

Assessing animal health and welfare from a certification bodies point of view

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Due to illness the author was not able to provide an abstract.

Problems and challenges with the certification of organic pigs

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There is reason for the assumption that consumers of organic produced pork have high expectations concerning animal health status and product quality. In Germany, there was only few information available concerning the current situation in organic pig production. In a survey carried out on 21 organic pig farms which delivered their pigs to a single abattoir, animal health status and quality of carcass and pork (n = 3989 carcasses) were assessed.

Only 10.5 % of the lungs showed middle to high-grade pathological findings. 11.5 % of the control group of conventional pigs (n = 46535) provided similar findings. 65.2 % of the organic pigs showed milk spots in the liver. In contrast, pathological findings in the livers of conventionally produced pigs were significantly lower (41.1 %).

Carcass quality of organic pigs was rated according to the EUROP-System: 30 % showed the classification "E", 46 % "U", 19 % "R", 4 % "O" and 1 % "P". The intramuscular fat content in the *M. longissimus dorsi* averaged to 1.53 %. Nearly all carcasses (95.4 %) reached a pH₁-value in the muscle of ≥ 6.0 . Regarding the housing conditions, only 3 organic farms completely met the requirements of the EEC-Regulation. Most of the farms were in the legally regulated transitional phase. Insufficiency existed regarding the outdoor pens, while the movement areas in the stable corresponded to the requirements. Severe deficits were detected in relation to the feeding management. Nevertheless, the fatteners achieved average daily live-weight gains of 657g. Farmers, who put the recommended measures to decrease the parasite load into practice consistently, achieved a significant reduction of milk spots but did not reach an acceptable level. The spot sampling of blood analysed for mycoplasma and salmonella antibodies revealed that animals on most of the farms had contact to the pathogens.

The results of the investigations showed that the examined organic pig farms did not meet the high demands towards organic livestock production in relation to management and quality assurance in all aspects. The basic standards of organic livestock production might be helpful but are not sufficient to secure a high level of animal health and product quality. Insufficient feedback and a lack of honouring the efforts by premium prices as well as missing health and quality controls measures may be responsible for existing deficits and, on the other hand offer options to improve the current situation.

The objective of a high animal health status and a high sensorial quality of pork requires specific control measures. To stimulate management efforts on organic farms it is suggested to lay an

increased claim to organic products, especially to allow only those animal products to be labelled as organic that have been proofed to be derived from healthy animals.

Development of Organic Livestock Production and Certification in Latvia

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Organic farming is developed many years in Latvia, nevertheless only during the latest 5-10 years it has obtained a special actual significance. Earlier this farming method mainly was used for plant products obtaining. The scientists of the Research Centre "Sigra" of the Latvia University of Agriculture many years carry out the investigations on animal food products quality (including organic farming products), what producers deliver for processing and market. A special attention in these products production would be paid to food "chain" critical points or risk factors, what presence and lability determines its frequency and profundity. The higher production standards, better technological solutions, qualified staff the less possible risk factors manifestation and more guaranteed higher products quality. To ensure product quality the following critical points must be point out in food "chain": soil → plants, forage, animals, animal health → food → safety → processing → products → labeling → delivery. Paralelly to risk factors "chain" animals welfare and bioethics basic principles must be observed. Organic farming animals feeding is carried out according to A or B systems. For animals treatment plant preparations, homoeopathic means as well as physical-therapy and accupuncture methods must be used. Organic farming, incl.organic livestock production can be developed in Latvia if the following tasks will be fulfilled:

- Provide local market with necessary amount of organic products and study possibilities for export
- Develop organic products processing
- Extend and develop organic farming educational system
- Elaborate balanced state subsidies programme for future organic development
- Continue a development of the certification system.