

Animal health of ruminants

A summary of research conducted under the German Federal Programme for Organic Agriculture and other forms of Sustainable Agriculture

BÖLN

Bundesprogramm Ökologischer Landbau
und andere Formen nachhaltiger
Landwirtschaft



Summary of research results of the German Federal Programme for Organic Farming (BÖLN), 2001-2011

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1. Soil fertility – <http://www.orgprints.org/21868>
2. Plant protection in organic arable and horticultural production - <http://orgprints.org/21869>
3. Plant protection in organic apple production - <http://orgprints.org/21875>
4. Nutrition of monogastrics - <http://orgprints.org/21874>
- 5. Animal health of ruminants - <http://orgprints.org/21872>**
6. Food quality and processing - <http://orgprints.org/21871>
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1. Introduction

The German Federal Programme for Organic Agriculture (BÖLN) was founded in 2001, with the goal of improving the conditions for organic farming and food industry in Germany, and to achieve the conditions for a balanced growth of supply and demand. The programme is funded by the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), and implemented and coordinated by the Federal Agency for Agriculture and Food (BLE) in Bonn. Since 2008, the programme is part of the German National Action Plan (2005-2014).

Since the beginning of 2011, the second evaluation of the programme (project ID 09OE027) is carried out by the international contractor group Organic Research Evaluations; consisting of the partners InterVal GmbH in Berlin, The Organic Research Centre, Elm Farm, United Kingdom and the University for Sustainable Development in Eberswalde, Germany.

The focus is on the programme of the BMELV to support research projects in organic farming, where more than 650 projects have been funded since 2002. The evaluation is in particular to clarify the extent to which research results helped to strengthen organic agriculture in Germany and expand its market share. The evaluation results, which are expected to be publically available in early 2013, shall also benefit a future optimisation of research funding.

The summaries of research results in eight focus topics (soil fertility, plant protection in arable and horticultural production, plant protection in apple production, nutrition of monogastrics, animal health of ruminants, food quality and processing, regional marketing and knowledge transfer) from the whole period of the programme since 2002. All projects can be identified with the individual project ID number, shown in brackets in the title; and following the link below, further information can be found on the German BÖLN website. Where available, links to the final-reports of individual projects on the Organic Eprints website are added. Further results of running projects of the BÖLN research programme are regularly published at www.bundesprogramm-oekolandbau.de.

2. Summary

Between 2002 and 2003, a survey established the status quo of organic dairy and beef production. A questionnaire was sent to 750 farms, supplemented by an on-site survey of 100 farms that supplied data on livestock performance, profitability, feeding, animal health and housing conditions. In a number of the 74 dairy farms investigated, deficiencies regarding animal welfare were found, because recommendations for disease prevention had been implemented poorly. In the production of suckler cows only a few problems were identified; the main obstacle to further development of organic cattle rearing was considered to be the low prices paid to producers. A further study looked at what preventive measures against the major disease groups of mastitis, lameness, metabolic disorders were used in organic dairy farming, collected data on the actual animal health situation and developed preventive animal health concepts that were made available to advisory services. In the same period, a study of the effect of homeopathic remedies for mastitis in dairy cows showed that the use of dry-cow antibiotics can be reduced, but their use cannot be fully eliminated in problem cases.

Another status analysis from 2003 to 2004 focused on the state of knowledge on issues such as mastitis, fertility, metabolism and claw disorders in dairy cows and selected diseases in pigs and poultry. The surveys showed that the health status of animals in the organic livestock was not significantly different from that in conventional animal production and that there was a relatively high incidence rate, regardless of the production method. Between 2004 and 2005, a vulnerability assessment of the acute need for improvement focusing on small ruminants was carried out, leading to various recommendations.

In 2007, building on the previous results, a large, interdisciplinary collaborative project on the health and performance of dairy cows was set up. At the same time the CORE Organic project on health planning for dairy cows (ANIPLAN) was running (also in the UK). The German subproject included the aims to develop animal-health-and-welfare plans (AHW plans)¹ for organic dairy farming, the monitoring of health and welfare of dairy cattle, and the development of advisory tools, including the initiation of regional 'stable schools' as an innovative means of communication on the subject of animal health and animal welfare. A further project on stable schools is still ongoing. In 2009, a project was initiated to assist farmers in grazing management with the help of a web-based decision-tree tool. The aim of another

¹ Animal health plans for organic farms were only compulsory in the UK, not in the rest of the EU.

ongoing project is to improve udder health in dairy goats by identifying appropriate indicators for the early detection of subclinical mastitis.

3. The individual projects

Organic milk and beef production (02OE348) 15-08-2002 to 31-12-2003 <http://www.orgprints.org/13434/>

In this project, data on organic milk and beef production were collected from control bodies and farmers' associations and similar bodies, capturing data on herd sizes, housing and husbandry systems as well as irregularities and infringement of organic rules. A questionnaire survey (750 farms established the characteristics of farm type, herd size, housing conditions and breeds. On-site surveys of 100 farms gave further information about performance parameters, economics, feeding, animal health and housing conditions. Of the 74 dairy farms investigated, a number had deficiencies regarding animal welfare (e.g. barn dimensions and design, barn climate), which were partly confirmed by the status of the animals (e.g. skin lesions). On the dairy farms, the milk yield was 6,000 kg/cow and year, and the main diseases were mastitis, claw disorders and fertility problems. Recommendations for disease prevention had in some cases been poorly implemented (e.g. ration planning, data analysis, udder hygiene, foot care). On the 27 farms keeping suckler cows only very few problems were found. Major obstacles to the further development of organic beef cattle were considered to be the low prices paid to producers. It was concluded that profitable production of beef from suckler cows is not possible without grant aid.

Preventive animal health concepts for dairy farms (02OE612) 01-10-2002 to 31-03-2004

<http://orgprints.org/8512/> and <http://orgprints.org/14695/>

The aim was to capture data on preventive measures being used for the important diseases of mastitis, lameness and metabolic disorders in organic dairy farming, as well as to monitor the actual animal health situation and to develop preventive animal health concepts and make them available for advisory services. The procedure was based on a detailed literature review, a questionnaire survey of 750 farms for preventive measures in use, data collected on 50 focus farms and a nationwide survey of advisors and veterinarians. Based on this material, recommendations were developed for the farming community in the form of a practical catalogue of measures which were discussed in a project workshop.

In the representative sample of focus farms the average treatment incidence for mastitis was 33% (ranging from 0 to 101%). When looking at several preventive measures in detail (e.g. teat disinfection), in the majority of cases no positive effects were found on the mastitis; automatic teat stimulation showed the strongest effects. These results, however, need to be treated with caution, since this could be a result of the small sample size and the lack of a multivariate analysis. The mean lameness prevalence was 18% (2-53%). Herds in cubicles had significantly higher prevalence of lameness (20%, 4-53%) than those with loose housing or straw yards (10%, 2-19%, $P < 0.01$, Mann-Whitney U). In addition, correlations were found with shortcomings in the housing environment and inadequate deformability of the lying area. The incidence of metabolic disorders was highly variable between farms. Milk fever incidence ranged between 0 and 25% (mean 5.9%), while clinical ketosis (0-12%), acidosis (0-11%) and abomasal displacements (0-2%) occurred significantly less frequently. The results of this study confirm that production diseases such as mastitis, lameness and metabolic disorders play a central role in organic dairy farming. The expert panel pointed particularly strongly to the need for increased knowledge transfer.

Animal Health Concepts: Clinical investigation of homeopathic remedies (02OE410) 01-10-2002 to 30-11-2004 <http://orgprints.org/12683/>

The need for fundamental research into the therapeutic safety of the complementary medical treatment of mastitis in dairy cows, an economically important problem, was recognised. The prophylactic and therapeutic effect and efficacy of nosodes were clinically tested, to develop for example new ways for drying off cows that comply with the organic rules and to create protection against new infections. On one dairy farm (250 cows), a homeopathic prophylaxis for drying off with complete avoidance of antibiotic dry-cow therapy was tested. A herd-specific mixed nosode (D30) was compared to a placebo. The number of new infections and healing and illness rates were compared between the two groups. In the treatment group, the rate of new infections *post-partum* was 20%, and was 5-20% lower than in the placebo group over the observation period ($P > 0.05$). . Not using antibiotic dry-cow therapy did not lead to deterioration of udder health, but among other effects led to an increase in the number of healthy udder quarters. Although during the study udder pathogens occurred, there was no increase in mastitis incidence detected. The results show that the use of dry-cow antibiotics can be significantly reduced by using homeopathy, but cannot be completely eliminated, especially in problem cases. Optimising the environment of the animals remains an essential prerequisite.

Status report on the state of animal health (03OE672) 01-11-2003 to 30-04-2004 <http://orgprints.org/5232/>

A meta-analysis of literature research on the state of knowledge on animal health in organic livestock was conducted. This considered in more detail mastitis, fertility, metabolic and hoof disorders of dairy cows, selected diseases of pigs and poultry, and parasitic diseases. The results of the review and the conclusions to be drawn were discussed with a group of experts. The analysis led to the conclusion that the health status of animals in organic livestock is not distinctively different from that in conventional animal production. Regardless of the production method, incidence rates are relatively high, with the variance between farms greater than that between farming systems. Causes for significant variation are attributed to inadequate management. Maintaining the health of the herd is hampered by financial issues and labour demands, as well as structural problems and conflicts. Various initiatives to improve this situation have so far not resulted in much success.

Organic livestock management could play a leading role in an effort to achieve a high animal health status. Based on overview of the various aspects, it was concluded that the current situation can only be substantially improved if a fundamental change from a standards- and practices- to a results-oriented approach take place. Under the present conditions there is little scope for improving animal health as this takes lower priority compared to other farm management outcomes such as lower production costs, labour savings and improved performance. Such a change requires the support of agricultural policy.

Animal health in the food chain management of organic dairy farming (03OE406) 01-09-2004 to 31-05-2008 <http://orgprints.org/14695/>

The aim of this project was to develop a practical animal health management programme for organic dairy farming on the basis of preventive animal health concepts, using the example of lameness. The management concept is based on an intervention study on farms validated with corresponding potential for optimisation, and subsequently checked for its practicality. Transfer of the results into agricultural practice was assured by means of information events and a workshop for farmers and consultants. The aim was (1) to develop a preventive animal health approach to organic dairy farming using the example of lameness and (2) validate this management concept based on an intervention study and to demonstrate its practicality. Over a period of three years, the lameness situation was monitored 43 organic dairy farms. On 21 intervention farms a farm-specific package of measures was developed jointly with the manager. The lameness prevalence declined on these farms consistently and significantly more than on the control farms.

Further elements of the study were to (1) identify the main indicators of dairy health and set targets (mastitis, lameness, metabolic disorders, fertility problems, calf diseases), (2) create guidelines for the development of herd health plans and (3) investigate the feasibility and effectiveness of the plans on-farm with the involvement of managers, consultants and veterinarians. A year after the introduction of animal health plans the incidence of clinical mastitis had reduced significantly more on farms that had implemented specific treatment measures than in the control group.

Development of preventive animal health concepts (03OE458) 01-05-2004 to 30-04-2005 <http://orgprints.org/5381/>

Practicable procedures to prevent infections, nutritional deficiencies and diseases and external parasites were developed and existing knowledge was assembled into concepts. Using a vulnerability assessment, the acute need for improvement in the area of animal health in small ruminants was derived. The results apply to organic and conventional farms. The lack of availability of specialised veterinarians/consultants in many regions is very problematic. Endoparasites: Through prevention, diagnosis and restrictive targeted drug use a tolerable level of parasite pressure can be achieved and the likelihood of the development of resistant strains can be reduced. Individual animal or group treatment should replace the routine treatment of the total herd. Keeping the herd mainly indoors with access to an exercise yard may be sensible on problem farms. A herd health plan and breeding for resistance is desirable. Alternative treatments cannot currently be recommended.

Infectious diseases: The main prevention measures are routine herd documentation and the examination of dead animals and those with stunted growth (from 5%). Voluntary, modular hygiene programmes are preferred by farmers over binding standards.

Homeopathy is not indicated for worming but can be relevant to strengthening the immune system. A positive side-effect of using homeopathy can be improved observation of animals and more specific management. Increasing loss of biodiversity contributes significantly to the depletion of the feed base. In diagnostics, research is urgently needed in the area of reference values and regarding the local expected trace elements supply in forages.

Preventive animal health in small ruminants (03OE458/F) 01-11-2005 to 28-02-2006 <http://orgprints.org/8955/>

The project was aimed at transferring knowledge from new approaches to preventive animal health in small ruminants into practice. The results of a previous project (03OE458) were analysed to work out which areas are especially relevant to farmers, consultants and veterinarians. On this basis, a two-day training course was designed. The response to the entire event from the participants was extremely positive.

Minimising the use of medicines in organic dairy herds (07OE003) 15-06-2007 to 31-10-2010 <http://orgprints.org/18772/>

The subject of the German sub-project of this CORE Organic ANIPLAN project was (1) to develop, in cooperation with European partners, animal-health-and-welfare plans (AHW plans) for organic dairy farming, based on the experience of the existing project (03OE406) (2) to complete existing animal health plans with parameters of wellbeing and check the effectiveness of these AHW plans on 20 representative commercial farms in Germany and (3) to initiate regional "stable schools" as an innovative means of communication on the subject of animal health and animal welfare. For this purpose, existing indicators of animal health (taking into account mastitis, lameness, metabolic disorders, fertility problems, calf diseases), associated outcomes and survey protocols, and lessons learned in previous projects for the development and implementation of animal health plans of all the European partners were considered. Twenty organic dairy farms were visited twice in order to collect indicators of animal health and welfare. During the first visit, animal health plans already implemented were checked for effectiveness, and aspects of animal welfare were added. In addition, individual farm AHW plans were implemented and checked for effectiveness at the second visit - about 6 months later. Three regional workshops were held with the goal of optimising animal health and welfare and minimising the use of veterinary drugs through the use of AHW plans. The results are relevant to the different conditions of organic milk production throughout Europe. The research areas included animal health planning, the assessment of the health and welfare of dairy cattle using animal-related parameters and the development of guidance tools for farmers. Epidemiological analyses of the reduced use of veterinary drugs and the improvement of the animal health situation were carried out across national borders.

Health and performance of dairy cows (07OE012-22) 16-07-2007 to 31-12-2011 <http://orgprints.org/19933/>

With the overall aim of sustainable improvement of udder health and metabolic health in organic dairy farming the project had the following objectives: (1) derivation of risk estimates for metabolic and udder diseases by studying their incidence and causes during the pre- and postpartum period and in the first 100 days of lactation on 100 organic dairy farms; (2) investigation of monocausal correlations with experiments; (3) based on these results, development of a practical, prevention-based animal health management scheme; (4) validation and verification of the practical feasibility of the management scheme based on an intervention study on working farms; (5) effective implementation of the project results in agricultural practice with meaningful and user-friendly advisory and training materials. The basis of the pyramid-like structure of the project is scientific data collection on farms, which is followed by a risk assessment by experts in various fields. Results derived from on-farm data collection are supplemented by experimental results and reviewed at the next step for their feasibility. Promising measures are implemented on farms and their success is verified by means of repeated data collection and modelling as needed. All project results are brought together in a final step and culminate in a specific guide to action. In line with the required specifications the project concept is based on an interdisciplinary approach in order to determine, through cooperation, the factors influencing metabolic and udder health in the production chain of grassland/leys for roughage production, feed quality and feed rations up to the housing environment and process engineering.

Farm-level control of endoparasites (08OE162) 01-11-2009 to 30-09-2011

The main aim was to develop an internet-based decision tree for farmers to support forward-looking planning of grazing decisions. The project adapted a Dutch decision tree to German conditions for cattle, sheep and goats which was further expanded and supplemented.

Udder health monitoring in dairy goats as a preventive measure (08OE178, 09OE016) 01-11-2009 to 29-02-2012

The aim of the project was to improve udder health in dairy goats by identifying appropriate indicators for the early detection of subclinical mastitis. Since the standard diagnostics (cell count, bacteriological findings) cannot be applied to goats, various physiological parameters were tested individually or in combination for their ability to assess udder health. At the experimental station of the Institute of Organic Agriculture milk samples of 60 dairy goats were taken weekly over the entire lactation. The following parameters were analysed: (1) in foremilk: conductivity, CMT; (2) in first milking of halves: cell content, detection of mastitis-causing organisms and differentiation (PCR), lactoferrin, LDH, NAGases, β -glucuronidase; (3) in whole milk: milk components. Every month, the udder and teat end condition were

monitored and lactation curves recorded. Data on total milk yield, milking time and conductance of total milk yield were collected during milking. On two farms with 60 goats a validation of the parameters was carried out. The fundamental relationship between udder health and physiological parameters could be clarified, resulting in a management tool for the farmer.

Bedding materials and management (08OE196, 09OE012) 01-09-2009 to 31-08-2011 <http://orgprints.org/19933/>

It is known that the bacterial counts in bedding materials correlate with the rate of clinical mastitis. So far, however, the conclusion of the causal chain is missing in terms of the influence of the colonisation density of the udder on the colonisation density of the teat canal, and the genetic similarity of microorganisms on the udder skin and teat canal and within the milk glands of the infected quarter. The research and development project follows the potential infection chain cubicle-litter-udder skin-teat channel-udder lumen, identifies the relevant critical points, and derives recommendations for litter management that reduce the risk of mastitis. Besides cutting costs for mastitis control, the results will also contribute to reducing drug use and improving animal health in organic dairy farming.

Preventive measures to improve health in sheep (08OE187) 01-11-2009 to 31-05-2012

<http://orgprints.org/21641/>

The aim of this project is to evaluate the health and longevity of sheep on organic farms. Through farm visits, extensive animal studies, and data provided by the breed associations, risk factors affecting animal health and longevity will be identified. Based on this, a monitoring system is developed which makes it possible to obtain early information on the health status of the animals and to take timely measures to promote animal health and with that also the profitability of organic farms. All animal information is either based on data provided by the breed associations or collected through farm visits and monitoring of individual animals. Comprehensive checklists for animal health are supplemented by laboratory testing of milk and faecal samples. All acquired characteristics are reviewed in terms of their use for a monitoring system and provide the basis for a management tool designed to support decision-making in herd management.

"Stable schools" as a management tool in dairy farming (10OE017) 01-10-2010 to 30-11-2011

The aim of this project is to: (1) implement regionally active model "stable schools" on animal health in organic dairy farming in Germany, (2) capture objectively the farm-specific baseline data of the status quo of animal health indicators and (3) review the implementation of the measures that were developed and thus perform an initial review of the effectiveness of stable schools as a means to improve animal health. The project allows statements about the following questions: - How do managers view the benefit of this tool in operation? - Can work in regional stable schools motivate farmers to improve the animal health situation on their dairy farms? - Can feedback about the animal health situation (in an indicator-based approach) promote awareness regarding animal health? –Are solutions agreed during the stable schools implemented? – Were the packages of measures developed during the exchange of practitioners at the stable school meetings effective in improving the animal health situation on specific farms?