



Federal Office for
Agriculture and Food

BÖLN

Bundesprogramm Ökologischer Landbau
und andere Formen nachhaltiger
Landwirtschaft

Supporting research under BÖLN

for organic and sustainable agriculture



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BÖLN –

a driving force in promoting an organic and sustainable agri-food sector

Germany is Europe's largest organic market. Demand for organic food and sustainably produced goods has grown continuously over the past 15 years. Yet as the organic sector increasingly becomes a key branch of economic activity, the tasks facing each individual farmer, processor and seller become ever more complex and challenging. Success in establishing a market position requires more than simply a commitment to and an identification with the values of organic farming. Solid technical expertise is required, together with a particular understanding of the complex interrelationships underpinning the cultivation, processing and marketing of products.

BÖLN

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In order to meet these growing demands, stakeholders in the sector are reliant on competent technical support from extension services and the research community. This requires research that can be applied to actual practice and which focuses specifically on the particular challenges facing the sector along the entire value chain. The Federal Scheme for Organic Farming and Other Forms of Sustainable Agriculture (BÖLN), a programme supported by the Federal Ministry of Food and Agriculture (BMEL), has played and continues to play a central role as far as this challenge is concerned. Originally designed as a support programme solely for organic farming, the Federal Scheme was extended in 2010 to include other forms of sustainable agriculture under a resolution adopted by the German Bundestag. What had formerly been known just as BÖL – the Federal Scheme for Organic Farming – became BÖLN.

BÖLN is one of the longest established federal government support programmes. For more than a decade now, it has helped in actively promoting and advancing practice-oriented agricultural research for sustainable farming in Germany. The concrete findings of this research allow farmers and food manufacturers to keep their production methods up to date and to implement innovative solutions while at the same time meeting the economic requirements of the market. BÖLN thus makes an essential contribution to sustainable agriculture.

Supporting research under BÖLN

BÖLN identifies research needs, encourages applications for research projects, examines such projects in terms of their relevance, ability to be translated into practice and cost-effectiveness, and provides project funding and project support through to completion. In its capacity as an interface between research and practice, BÖLN ensures that knowledge is shared on an intensive basis. The programme's annual budget for these activities currently stands at around EUR 10 million. The office for the Federal Scheme is based at the Federal Office for Agriculture and Food (BLE) in Bonn.

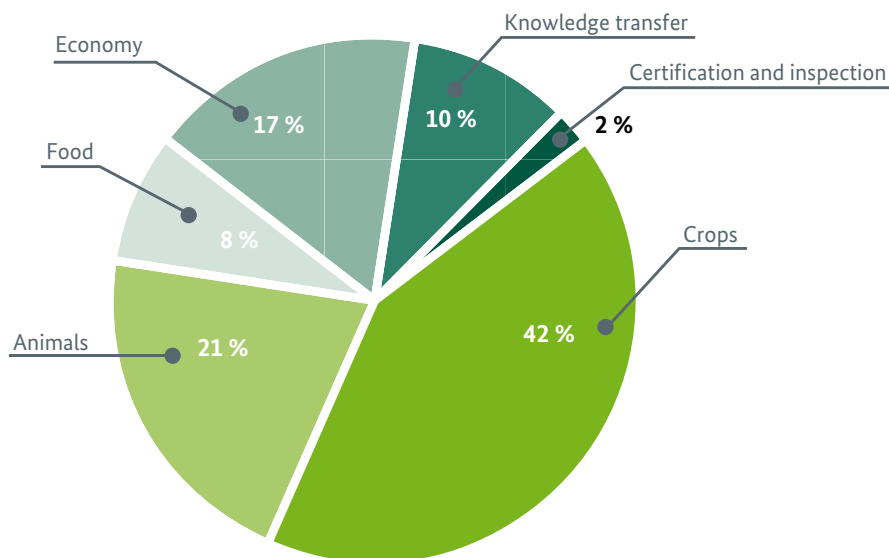
The BÖLN research programme in figures

- Establishment of BÖLN: 2002
- Annual budget: EUR 10 million
- Number of projects supported: 936
(data as at September 2016)

Pioneering research for farmers, processors and traders

The goal of BÖLN is to strengthen and expand the organic agri-food sector and other forms of sustainable agriculture. This means achieving quantitative growth while at the same time safeguarding and constantly enhancing high quality standards along the entire value chain. Accordingly, the priority areas of research cover a broad range of topics. Research and development projects (R&D projects) in the area of primary agricultural production account for by far the largest share of measures. They form the basis for the subsequent creation of value and cover all areas of the agri-food sector, including aquaculture, the cultivation of fruit and vegetables and viticulture. As far as crop production is concerned, sophisticated crop protection strategies and breeding approaches are just some of the measures that need to be developed and firmly established in practice. Research projects on animal husbandry look at possible ways in which feeding and animal health can be improved, for instance. These areas require solutions which meet society's growing demands with respect to animal welfare and animal welfare-oriented husbandry. And from an economic perspective, viable strategies which allow for a high level of value creation within the agricultural sector are needed.

In research carried out under BÖLN, support is increasingly provided for interdisciplinary projects along the value chain as a way of devising solutions for complex issues. As a result, fields of research are not always clearly distinguishable from one another; allocation of a project to a particular field of research depends on the project's focus.



R&D projects supported under BÖLN

Research funding under BÖLN – for organic and sustainable agriculture

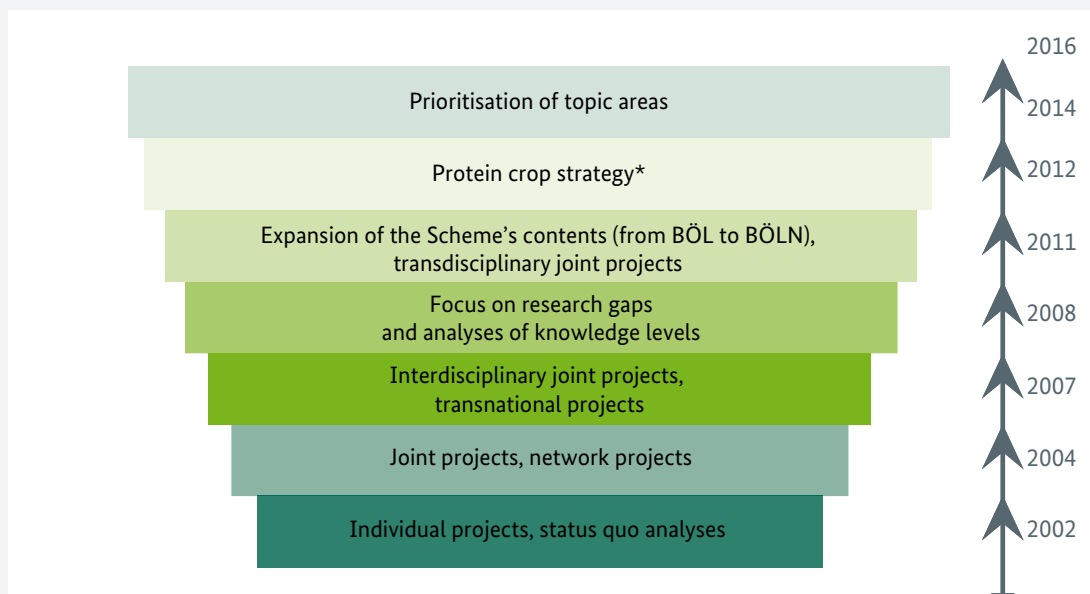
The range of support instruments under the Federal Scheme has grown steadily since BÖLN was set up. Initially, the primary focus was on carrying out individual projects and conducting status quo analyses. The aim of these analyses was to identify the most pressing problems, for instance in the area of animal husbandry, and to use these as a basis for deciding on areas where research and action were urgently required. Joint projects and network projects carried out with the close involvement of a whole range of research institutions stakeholders from the organic farming sector dominated the **second support phase**.

The start of the **third phase** saw the focus of BÖLN shift to providing support for interdisciplinary research projects. A key factor behind this change was the realisation that drawing on expertise from individual specialist areas is often not enough to respond to complex research matters. Instead, the key to new findings and innovative solutions is to combine different research approaches and methods from a variety of disciplines. The first transnational EU project (EU ERA-NET 'CORE Organic') was also launched (www.coreorganic.org). Analyses of knowledge levels aimed at determining concrete research gaps in individual areas, and a focus on urgent problems that have already been identified (such as finding alternatives to the use of copper) were the characteristic feature of the **fourth support phase**. The principle of transdisciplinarity, which aims to step up

cooperation between research and practice under the heading ‘On-farm Research’ took on even greater importance with the start of the **fifth support phase**. In order to achieve this, several joint projects were closely interlinked to create one thematic area – for example, monogastric nutrition – with a view to leveraging synergies and strengthening the relationship to actual practice. The findings were discussed and evaluated together with practitioners and consultants so as to identify further research requirements, if appropriate. Furthermore, the content of the Federal Organic Farming Scheme (BÖL) was expanded for the first time to cover other forms of sustainable agriculture, creating BÖLN in the process. The joint soybean project, an interdisciplinary partnership between research institutions, practitioners, extension services and processing companies, aimed at promoting and researching soybean cultivation in Germany, involves both organic and conventional farms; the entire value chain is therefore represented.

Since 2012, the **sixth phase** has focused on implementing the federal government’s protein crop strategy which provides support for the cultivation, processing and marketing of leguminous crops in Germany.* Research topics are currently being prioritised further under BÖLN. This is being done with the aim of identifying those topic areas across the entire process chain (‘from farm to fork’) which urgently require attention and of placing the Federal Scheme on a stronger programme-based footing.

The sharing of knowledge between the research community, extension services and practice – also termed knowledge transfer – is vitally important. It is a prerequisite not only for identifying new research issues with relevance for the field of practice, but also for ensuring that the actual target groups of farmers, processors and marketers actually receive, and are able to apply, research findings.



Development phases in BÖLN research

* independent support programme since 2014: see <http://www.ble.de/Eiweißpflanzenstrategie> (German only)

Front-line research – close cooperation between researchers and actual practitioners

Networks of advisors, excursions, presentations, demonstration networks, small-group work and much more besides: there are many different ways in which BÖLN ensures that knowledge is transferred into practice effectively and that as many stakeholders as possible in the agri-food sector benefit. A vital element in this regard is interactive knowledge sharing.



The primary aim of BÖLN research projects is to carefully examine problems that are relevant to what happens in practice.

Contemporary research is about much more than simply investigating scientific problems. Ensuring that newly acquired knowledge is put into practice is crucial. Yet intensive knowledge sharing between actual practitioners and the research community needs to be a two-way process. This is the only way to guarantee that all of the problems regarded by practitioners as being most important are indeed addressed by researchers. BÖLN places a particular emphasis on meeting this requirement by implementing knowledge sharing at a very early stage of the research promotion process. Even while identifying fields of research, researchers are consulted together with representatives from practice and extension services. This way, any research needs which are identified can be included in the thematic focus of new priority areas of support and calls for research. When assessing outline proposals for projects which they have received, researchers, advisors and practitioners will evaluate them for their usability and scientific excellence. Only if these two requirements are met does it make sense to provide support. As projects progress, project support groups evaluate the practical relevance of the findings that have been made. And at the end of each project, its participants are obliged to assess how their findings relate to practice via a process of self-evaluation and

to present the concrete benefits for practice in the form of data sheets. These are available to all interested parties, ranging from researchers and practitioners to media representatives, and in turn form the basis for further research support.

Knowledge transfer events are another particular focus of research management under BÖLN. This can benefit not only long-established farming operations but also newcomers from all levels of the agricultural value chain. For all of these target groups, knowledge transfer projects provide the opportunity to learn about key findings of BÖLN research projects and, in so doing, to participate directly in the advancement of knowledge. When research results are translated into practice, they can help farms to develop further, for example by improving their production system or internal operating procedures. However, knowledge transfer events also offer another particular benefit in that they bring representatives from the entire value chain together around one table. Only in this way are producers and manufacturers able to acquire an understanding of commercial requirements and devise sustainable strategies that the distribution sector will also adopt.

Besides funding research projects, BÖLN uses a variety of training, educational and information measures to both support and strengthen supply and demand of organic products and goods produced in any other sustainable manner. These events also address the findings of BÖLN-funded research projects and serve as a way of passing these findings on to the relevant target groups – to stakeholders in agricultural production, in recording and processing and in commerce, to large-scale and small-scale consumers and marketers.



Knowledge transfer is beneficial to both experienced organic farmers as well as to newcomers.

Ever since BÖLN was set up, numerous events, workshops and conferences have taken place on a regular basis. Between 2011 and mid-2012 alone, over 500 events were held. The scheme reached out to around 13,000 practitioners from all sectors and regions. The majority of events were organised and carried out by organic growers associations. In this regard, BÖLN benefits from the fact that the associations have established excellent networks with their regional groups and advisors. They are in close contact with farmers and business owners, have a precise understanding of their problems and needs and have the appropriate structures in place and the expertise required in order to transfer knowledge directly – whether in the form of special events or as measures to complement the training courses that are already available. And it should be remembered that organic growers associations also perform ‘reverse knowledge transfer’ by reporting back to researchers regarding the research needs of actual practitioners, thereby increasing the level of exchange that takes place.



Voices from the organic sector

Joyce Moewius, Bund Ökologische Lebensmittelwirtschaft e.V.
 (BÖLW, German Association of Organic Farmers, Food Processors and Traders)

“Both novice and experienced organic farmers use the broad range of topics covered by our knowledge transfer events to gain important ideas for their farms and to implement improvements in their own working environment, based on the latest findings of trials and research. Thanks to the financial support of BÖLN, organic associations are able to stage a large number of seminars, workshops and expert conferences for all stakeholders in the organic agri-food sector and other interested parties virtually anywhere in the country.”

Anke Kahler, organic baking consultant and chairperson of the trade association
 “Die Bäcker. Zeit für Geschmack”

“The main factors that bakers have to take into account when buying their raw materials are price and gluten content. The only way in which they can gain a better understanding of why the baking properties and varieties which they actually want are not available everywhere is to discuss the issue at length with cereal producers. This is why the knowledge transfer seminars arranged by BÖLN are so important, and not just for bakers and cereal farmers. Developing organic value chains further is only possible if those parties in the organic sector work together hand-in-hand.”

Martin Hermle, Bioland Advisory Team

“In the past, there was virtually no exchange between researchers, extension services and practitioners. Research on one hand, and extension services and practice on the other, existed alongside one another as parallel worlds. The knowledge transfer events allow us as advisors to act more or less as intermediaries between the research community and practice and to address current research approaches to a greater degree. However, it is also very important for us to do more than simply pass on theoretical knowledge in the form of lectures and presentations and instead support those taking part in our seminars to develop solutions that are tailored to their operations. This benefits organic research too: ‘reverse knowledge transfer’ means that researchers learn first-hand from those working in the field of the topic areas in which they would like to see further studies being carried out.”

Johannes Ott, Bioland dairy farm in Wald, Bavaria

“I’m always able to take a great deal away from the knowledge transfer events that I can then apply to my farm. The events do more than just cover economic aspects; I also learn things that you don’t hear about anywhere else. For example, in one of the seminars I learned that continuous grazing works very well as an alternative to rotational grazing and was able to introduce this successfully on my own farm.”

Close network of advisors

The Foundation Ecology & Agriculture (Stiftung Ökologie & Landbau, SÖL) has set up a network of advisors and practitioners as an essential component for successful knowledge transfer. The network comprises a total of 15 extension services organisations, 39 advisors and 400 practitioners. The network has focused on developing methods for comparing farms and for analysing the most important branches of production (dairy, pigs, poultry, arable farming and vegetable farming). Using the data derived from these activities, advisors and farm managers are able to make an objective assessment of a farm’s economic viability and how successful individual farms are on a comparative basis. This project has also succeeded in portraying the practice of organic farming across the board from both an output-based and economic perspective. Detailed analyses of working schedules and animal health in selected branches of production (dairy, pig and poultry) show that the farms examined have very heterogeneous structures and, in some cases, are still operating well below capacity.



Voices from the organic sector

Dr Uli Zerger, Executive Director of the Foundation Ecology & Agriculture (Stiftung Ökologie & Landbau, SÖL)

“In the past, advice in the organic sector was focused primarily on production techniques. The BÖLN project now gives advisors a tool that they can use to incorporate economic aspects into the extension services they provide to a greater degree than in the past. Farms are therefore better able to meet the challenge posed by growing competition. Furthermore, close cooperation across associations created a nationwide network which advisors continue to use intensively as a platform for sharing their expertise.”

A distinctive feature of research designed to serve the practical needs of a sustainably agri-food sector is that it covers a broad range of topics. This is also true of the research promoted under BÖLN. The list of topics below reflects the priority areas set by BÖLN in recent years:



Soil



Food quality and processing



Crop protection



Marketing



Plant breeding



Economy



Animal health

Given that there are many hundreds of projects which have been granted support, those projects presented in this brochure represent only a fraction of the full spectrum of research supported under BÖLN. As far as project selection is concerned, besides the relevance of the topic covered and the degree to which the research can be translated into practice, emphasis is also placed on the involvement of all levels of the value chain if possible.

The broad variation of the projects, both in terms of their topics and methodologies, illustrates the multifaceted activities of BÖLN in seeking for answers to the most pressing questions regarding research in the organic sector and the sustainable agriculture sector.

Precious topsoil – research into soil fertility and sustainable arable farming

Fertile soil is the basis for healthy crop growth and the production of sufficient quantities of high quality food. Preserving and enhancing soil fertility have always been overarching objectives of organic farming. If soil is fertile, it means that it is both healthy and productive. Within the research promoted under BÖLN, projects focusing on sustainable tillage, fertilisation and crop production have always played an important role.

In view of the fact that soil in particular represents an extremely complex system, the interdisciplinary research approach characteristic of many research projects under the Federal Scheme is particularly appropriate here. Cooperation between different disciplines is a way of linking together the various different approaches, methods and practices which are employed. The involvement of practitioners and extension services in this process is very important. Thanks to the practically-oriented nature of research, research findings and recommendations from the projects can be applied directly in practice. This in turn helps to develop existing farming systems further and also to improve them.



A boost for faba beans and peas

In organic farming, the areas under faba bean and pea cultivation have been falling for years. The findings of a practice-oriented five year BÖLN research project show that this can be attributed to a variety of reasons – and that there are many ways in which yields and yield stability can be improved.

Fluctuating yields, little progress in terms of breeding and soil suffering from legume fatigue – the list of causes for the fall in the area of land devoted to faba bean and pea cultivation is long. Under such circumstances, there are many advantages to cultivation; not only do these crops provide considerable benefits as preceding crops, but they also help to create a favourable soil structure and, not least, are a valuable protein-rich animal feed that can be used on individual farms.



Field day on soil fertility

In an attempt to enhance soil fertility and plant nutrition, especially on farms with a high proportion of cash crops, by improved management, BÖLN launched a soil fertility project in 2008 stretching over five years. Researchers from a whole range of disciplines, practitioners and advisors cooperated on this project. The primary focus of the project was on ways to improve not only the selection of plots of land, but also fertilisation and the prevention and combating of weeds and pathogens. To this end, the researchers involved in the project collected data from 32 organic farms. Based on the data gathered from more than 120 plots of land, they then drew

their conclusions and put forward recommendations which have a decisive impact on the yield and health of the crop.

Selecting the correct plot of land and understanding how this had been farmed in the past proved to be fundamental to its successful cultivation. According to the research findings, deep soil with excellent water retention was best suited for the two grain legumes in question, and particularly so for the growing of faba beans. The clay content should be no more than 20 percent (for peas) and 24 percent (for faba beans). Since faba beans, and peas especially, have a high degree of self-incompatibility, farmers must select a generous cropping interval. For example, faba beans should only be sown on the same area of land once every six years. In the case of peas, which are less self-compatible, ex-

experts recommend even longer cropping intervals, of nine to ten years at least, otherwise there is a risk that yields will fall considerably. Other varieties of legumes which have been grown before faba beans or peas can also lead to a fall in yield. As a result, when growing peas, care should be taken to ensure that the proportion of red clover or alfalfa in preceding growing years is small. The cropping interval between peas and faba beans should be at least six years.

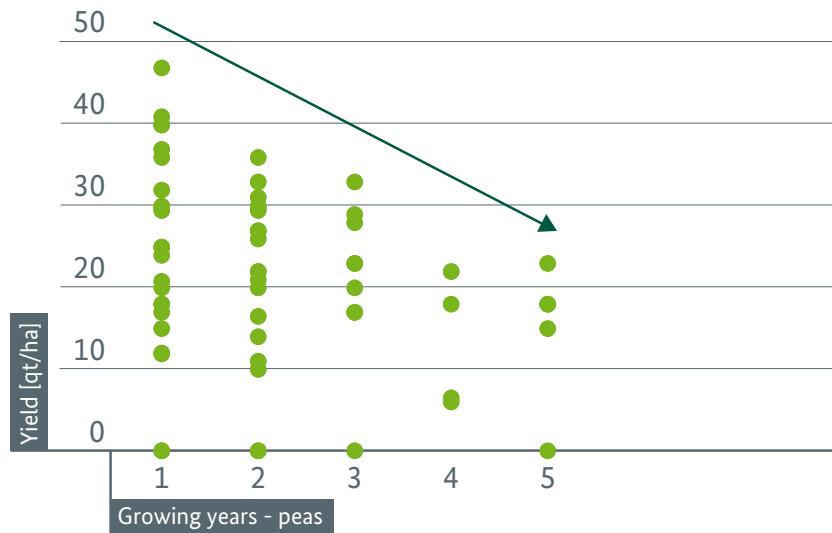


A quick test for choosing the right plot of land

Harmful organisms which build up and survive in the soil are one of the main causes of so-called soil fatigue in legume cultivation. Foot rot in legume populations is especially common and generally results in lower yields. It is therefore vital that farmers know which areas are infected with pests. To make the task of selecting the right plot of land easier for them, researchers working on the project developed a simple test for soil fatigue. In this differential diagnosis, soil samples from individual plots of land are taken roughly three months before sowing and examined by way of a germination test using pea and faba bean seeds. Soil that has been sterilised using heat is used as a control variable. If the plants show symptoms of disease during the early stages of growth, the corresponding plot of land is unsuitable. In analyses carried out on the farms under evaluation, the test proved to be reliable in most cases. One major benefit of the diagnosis is that farmers are able to perform the test themselves using relatively straightforward equipment (oven, aluminium trays, pots). At between EUR 74 and 91 per plot of land, the costs are also reasonable and these are already offset by an increased yield of approximately two quintals. On most of the farms that were tested, this additional yield that was required was easily exceeded.

Fertilisation and crop protection was another priority area of the project. The researchers found that the supply of key nutrients such as potassium and phosphate was deficient in many fields. Soil with a low phosphorus content had a negative impact on pea yields in particular. Compost from plant material proved to be well suited as a fertiliser for grain legumes since it provides phosphate and potassium and also has an ideal carbon to nitrogen ratio. Applying compost resulted in increased yields of between 10 and 15 percent. Underpinning this effect is also the fact that compost stimulates microbial activity in the soil, suppressing pests in the process. This proved particularly effective to the crops when compost was applied in rows, near to the root. During the project, the positive impacts of wood chippings too were shown to not simply be confined to their fertilising effect. The best results were achieved using finely chopped coniferous woods which proved effective against annual weeds such as white goosefoot.





Actual yield of white-flowering grain peas depending on frequency of cultivation (in 25 years)

The researchers working on the project also investigated the effects of soil compaction by machinery, different weed control methods, for instance through mixed cropping, and used economic calculations to examine the best time for farmers to grow peas and faba beans. The soil fertility project is therefore one of the most extensive studies carried out to date on improving legume cultivation. The involvement of organic farms, the interdisciplinary approach and the close cooperation between researchers from a whole array of disciplines mean that the findings obtained and the recommendations given are particularly useful.

The findings and practical recommendations from the research project have been compiled in a brochure. The brochure is available free of charge and can be ordered from the BÖLN office (boeln@ble.de).



Further reading: these and other BÖLN studies

- Enhancing the economic value of organically produced cash crops by optimising the management of soil fertility (joint project)
www.orgprints.org/20443/
- Brochure for practitioners on grain legumes and soil fertility
www.oekolandbau.de/bodenfruchtbarkeit
- Influence of management techniques on the structure and function of the soil microflora
www.orgprints.org/19905/
- Reduced tillage and green manures for sustainable organic cropping systems
www.orgprints.org/19926/
- Effect of different strategies of sulphur fertilisation on yield of grain legumes and the grain yield of the follower crop in organic farming (joint project)
www.orgprints.org/21710/
- Ensuring the yield potential of lucerne-clover-grass-mixtures by improving the current sulphur availability on ecologically managed areas – situation and importance and practical conditions
www.orgprints.org/19684/



No-till cultivation of faba beans also an option for organic farmers

No-till cropping practices are barely used in organic farming due to the problems they create as regards weed infestation and reduced nitrogen release in spring. In this respect, for legumes in particular, reduced tillage can help increase soil fertility over the long term. A research project on the no-till cropping of faba beans showed that the method is particularly suited to organic arable farms.



Direct sowing of grain legumes

The decision to forego tillage can help cut arable farming costs considerably, most notably due to lower fuel requirements and reduced labour input. Many conventional farmers have been employing no-till methods successfully for quite some time now, often in conjunction with the use of herbicides and mineral nitrogen fertilisers. In organic farming, it is virtually impossible to balance the reduction in

the release of nitrogen in the soil by increasing the nitrogen supply using fertiliser, while the use of total herbicides for controlling weed infestation is not permitted. As a result, reduced tillage with direct sowing makes little difference. The method would appear to be particularly useful for organic legume cultivation since nitrogen availability levels improve over the long term which in turn boosts soil fertility.

Researchers from the University of Bonn, University of Göttingen and Dresden University of Applied Sciences therefore conducted a three-year research project in which they began by developing various reduced tillage strategies for the cultivation of faba beans and peas by adopting methods such as mulching and direct seeding, before subsequently examining the impact of these strategies on soil fertility. In particular, the researchers examined the impact of mulch drilling methods on the yield, weed infestation and nitrogen flows in faba beans. The project also focused on studying the impact on the subsequent nitrogen fixation of faba beans when non-legumes are used as a catch crop.

Weed density remains the same

The researchers found that weed density remained more or less the same, irrespective of whether tilling is employed or if direct seeding with straw mulching is used; a reduced level of weed infestation was even recorded in some cases. Annual weed infestation decreased and the faba bean yield increased as more and more straw was used as a mulch. In contrast, even large quantities of straw mulch were unable to adequately control perennial weeds and grasses.

The amount of nitrogen symbiotically fixed by beans increased sharply when a non-legume catch-crop mixture of oats and sunflowers was grown. Another advantage of catch crops was the excellent impact they had in terms of weed control.

Sulphur fertiliser increases nitrogen levels

The root development of bean varieties sown directly in non-loosened soil was just as good as that of varieties sown in soil that had already been ploughed. The nitrogen levels measured in the leaves of the different varieties did not show any differences either. It was noticeable that where sulphur fertilisers were applied to soils with inadequate nutrients, the nitrogen content in the leaves of faba beans also increased significantly.

Based on the findings of the project, the researchers consider reduced tillage in combination with mulching to be cost-effective when faba beans are grown organically. With certain limitations, this also applies to grain peas. Temporary direct sowing, on the other hand, is only useful for the cultivation of faba beans. However, in order to be able to implement both methods in a cost-effective manner, certain conditions must be in place. For instance, overall weed pressure – especially from perennial weeds – should be very low and there should be enough straw available to use as mulch. That is why the method is particularly appropriate for farms without livestock which do not require straw for litter, but instead wish to leave it on fields as an organic substance so as to preserve or increase humus levels.



Further reading: these and other BÖLN studies

- Developing strategies maintaining and increasing soil fertility: cropping systems combining pulses with mulch husbandry
www.orgprints.org/20737/
- Optimizing weed control, sulphate and phosphate nutrition of soybean and faba bean under reduced tillage systems (joint project)
www.orgprints.org/23224/
- Enhancing the economic value of organically produced cash crops by optimising the management of soil fertility (joint project)
www.orgprints.org/20368/
- Optimizing the management of soil fertility – effect of soil stress on the structure of soil and on the yield of peas and oats
www.orgprints.org/20968/



Mulch enhances soil fertility – but to what extent?

The positive effects of mulch have been scientifically proven. However, the way in which mulch affects the water and nutrient balance in quantitative terms is the question facing farmers. One study shows the extent to which the effect of different mulch materials should be taken into account when applying fertiliser and when watering.



Mulching as a form of protection against soil erosion in agriculture

Different types of mulch, such as straw, compost or wood chips, provide many benefits in arable farming and horticulture. Among other things, they offer protection against erosion, reduce soil slaking and prevent unwanted weeds from forming. These and other positive effects have been demonstrated in a large number of studies. However, all of the studies carried out to date have neglected to consider the extent to which the application of mulch affects the soil's nutrient and water balance. Furthermore, no studies have yet been conducted on whether there are any variations in the effect of different types of mulch on soil, and if so, how big these variations are.

In order to fill these knowledge gaps, researchers from the Erfurt University of Applied Sciences carried out a project stretching over several years. In pot and field trials, they examined the degree to which key nutrients such as nitrogen, phosphorus, potassium and magnesium are either released or immobilised when using different types of mulch, how these different types of mulch alter the soil's water balance and what the overall effect of mulching is on yield. Head lettuce and Brussels sprouts were the two crops chosen by the researchers.

More soil water means greater yield stability

Compared to soils on which no mulch had been applied, the positive effects of mulching in terms of soil hydrology were clear. Over a period of eight years, the average quantity of water available to plants which is retained by soils that have been mulched regularly was 42 litres per square metre more than was the case in the control specimens (where soil depth is 0–60 cm). The advantage to farmers is that yields become more stable while at the same time costs are reduced as less watering is required. The mulched soils also

averaged an additional yield of 1,000 kilogrammes dry matter per hectare. These figures were confirmed in the field trials.

Whereas there were virtually no differences in the effect on soil hydrology of different types of mulch, the various organic substances influenced the nitrogen dynamics in very different ways. For instance, compared to the control variable, between 100 and 380 kilogrammes of additional nitrogen were released per hectare for grass (cumulative effect in the trial period, and where soil depth is 0–60 cm). By contrast, depending on the weather conditions, nitrogen immobilisation of between 15 and 70 kilogrammes per hectare was recorded when using wood chips, bark mulch or straw. With compost, the researchers established that no nitrogen release occurs during the first two years, although a release of up to 90 kilogrammes per hectare can be expected over the course of a number of years.

Guidance for practitioners

For farmers, the recommendation from these findings is that mulching needs to be considered as far as balancing nitrogen levels is concerned. More specifically, this means that they should either reduce or increase nitrogen fertilisation depending on the type of mulch used. As the project assesses the quantity of nitrogen which is either released or fixed, it allows the findings to be applied directly into practice. Although the focus of the project was originally on organic farming, the findings are, without limitation, also applicable to conventional horticultural and landscaping enterprises. Use of the findings would also appear to make sense in these areas given that the risk of nutrients leaching into groundwater is greater due to the often increased use of fertilisers and can be reduced by applying a layer of mulch.



Further reading: these and other BÖLN studies

- Reaction of different mulch materials on the nitrogen and water supply and soil – quantification of the meaning for organic farming
www.orgprints.org/17201/
- Enhancing the economic value of organically produced cash crops by optimising the management of soil fertility (joint project)
www.orgprints.org/20443/
- Optimizing sulphate and phosphate nutrition of soybean and faba bean under reduced tillage systems
www.orgprints.org/23224/



System-based plant health – intelligent strategies for controlling pests, fungi and more



The protection of plants in organic farming is primarily based on the principle of taking preventive action in an effort to preserve the health of the individual plant as well as crop stands. The emphasis in this regard is placed on the systemic approach, i.e. the cultivation system as a whole is considered in preserving the health of the plant. The aim of control measures is not to destroy weeds and pests completely, but to keep them at a level that is tolerable in economic terms. Applying this holistic approach, which is geared towards controlling intelligently the way in which the various different measures interact with one another, requires not only a sound understanding of the relationships between these measures but also considerable practical skills. Key factors in this approach include the implementation of cultivation measures (such as crop rotation, catch cropping, cultivation of leguminous plants, undersowing, increasing the number and type of beneficial organisms, appropriate tillage and the protection of soil life) as well as the use and promotion of natural plant defence mechanisms (selection of species and varieties, resistances, tolerances).

Improving this approach has been, and continues to be, at the forefront of the research promoted under BÖLN. This does not mean treating symptoms of a disease resulting from errors in the cultivation system with plant protection agents, but instead attempting to identify the actual cause so as to solve the problem by shaping the cultivation system as a whole. The creation of networks between farmers, extension services and researchers is of great importance in this approach. The aim is to identify problems in practice, look at them from a research perspective and examine strategies for solving them in practice, under real-life conditions, with the aid of extension services. Where necessary, the strategies should be developed further and then become firmly established. Only in this way is it possible to verify the feasibility of these strategies directly and to ensure that new methods are implemented into practice smoothly.

Successfully controlling fire blight in organic fruit growing

Fire blight is a dreaded disease among fruit farmers as severe infestation causes major economic damage. The normal use of antibiotics in conventional fruit growing is a controversial issue – not only among organic fruit farmers but also medical professionals who fear that help to create resistance in human pathogens. Over 14 percent of the area devoted to apple growing in Germany is farmed organically. A project carried out with the support of BÖLN successfully developed two viable strategies for controlling fire blight which did not require antibiotics.



Preventing fire blight is key to a successful apple harvest.

Infection with the bacterium *Erwinia amylovora*, the fire blight pathogen, repeatedly results in high yield losses for apples and pears. In extreme cases of infestation, entire orchards may have to be uprooted. Infection occurs mainly during wet weather in spring and summer. Infected blossoms and leaves wilt and change colour to brown or black, as if they have been burnt – hence the name of the disease. Even young fruit that have become infected quickly change colour and die. Insects and infected plant matter can spread fire blight bacteria rapidly. Fire blight is a notifiable disease as it can be both highly destructive and highly infectious.



Antibiotic use is a contentious issue

Streptomycin is the only effective antibiotic available in conventional farming, although its use is only permitted if a dispensation has been granted. The debate regarding the use and authorisation of streptomycin relate to fears surrounding the development of resistance to the antibiotic and the fact that traces of it can be detected regularly in honey. In most cases, the only action available to organic fruit farmers is to take indirect measures such as pruning back infected branches. The fear of large-scale financial losses and the lack of effective control strategies is one of several reasons why many fruit growers decide against switching to organic farming.

In 2004, BÖLN began a research project in which the aim of scientists was to develop an effective overall strategy that could be applied in practice for controlling the pathogen. In a series of projects, in which each project built upon the results of its predecessor, the researchers carried out a systematic study of the effectiveness and mechanisms of action of more than 60 preparations under laboratory greenhouse conditions. Successfully tested preparations were then trialled outdoors.

Encouraging reduction in infestation

The most effective products for reducing infestation among those trialled were Blossom Protect and the rock flour Myco-Sin, which were 78 and 61 percent effective respectively. Blossom Protect inhibits the propagation of fire blight bacteria by lowering the pH value and by means of the antagonistic effect of yeast cells which propagate after having been applied to susceptible areas of the plants. Myco-Sin too blocks the growth of bacteria by lowering pH value. However, the drawback of Blossom Protect is that it can increase russetting in apples when applied frequently, especially among susceptible cultivars such as Jonagold, Elstar or Santana. For example, the proportion of apples with russetting among these cultivars rose significantly after having been treated with the preparation three times or more. In contrast, an enhanced degree of russetting was not detected on a number of cultivars, even following repeated treatment. Included among these was Topaz, which is an important cultivar from the perspective of organic farming. The researchers therefore advise farmers to use Blossom Protect no more than twice when treating susceptible cultivars.



In vivo system to test the effectiveness of preparations against the fire blight pathogen *E. amylovora*.

Given that the propagation of *Aureobasidium pullulans* blastospores in Blossom Protect is vital in order for the product to be effective for a sufficient length of time, the researchers examined whether, for the purpose of combined treatment strategies, other

fungicides restrict the growth of *Aureobasidium pullulans* blastospores. These include in particular wettable sulphur and lime sulphur, which are used in organic farming for controlling apple scab. In each case, Blossom Protect was shown to be completely effective, irrespective of whether it was applied on an alternate basis or together with another sulphur-containing product in a tank mixture.

A strategy that can be applied in practice

If weather conditions mean that treatment with Blossom Protect on scab-susceptible cultivars is required more than twice, researchers and advisors recommend alternating Blossom Protect with Myco-Sin, depending on the weather conditions. Among cultivars susceptible to russetting, the efficacy of this strategy was similar to that of using Blossom Protect on its own. At the same time, the number of applications required was reduced by combining the two active substances. A combination of Myco-Sin and wettable sulphur is currently being used on cultivars sensitive to russetting as a second strategy to control fire blight and apple scab. Both strategies are already being applied in practice.

Alternative plant protection measures are fundamental to achieving success in organic farming, whether it be in crop husbandry, fruit growing or viticulture. For this reason, plant health projects have long been a focus of the research work carried out under BÖLN.



Further reading: these and other BÖLN studies

- Development of strategies for fire blight control in organic fruit growing
www.orgprints.org/20554/
- Resistance of apple and pear varieties of extensive fruit production against fire blight (*Erwinia amylovora*)
www.orgprints.org/5047
- Network for advancement in organic fruit growing
www.orgprints.org/16648



Healthy grapes with a lower copper content – a joint project to control downy mildew in organic viticulture

For organic winegrowers, downy mildew of grapes is one of the most problematic diseases that exist. For a long time, the fungus could only be controlled using copper-containing preparations. However, the ecotoxicological effect of such preparations is disputed. BÖLN therefore initiated a joint project aimed at developing strategies to minimise the use of copper. In this regard, the project was a success.



Organic winegrowers are resorting to copper-containing preparations in an effort to control mildew diseases.

Organic wine is one of the areas of organic produce in which growth is strongest. As at the end of 2012, just under 7,400 hectares of vines were cultivated organically. Downy mildew (*Plasmopara viticola*) is regarded as the most significant cause of damage in organic viticulture. In warm and humid weather conditions, the fungus can spread quickly like an epidemic, resulting in huge losses both in terms of yield and quality of grape. If infestation is at an advanced stage, controlling the disease is virtually impossible. That is why it is particularly important for winegrowers to identify the pathogen early and take measures to control it.

The only available and authorised active ingredient at the start of the BÖLN-backed joint project in 2004 was copper, in a number of different formulations. However, copper is considered to be problematic because the metal accumulates in the soil and in various organisms and can be toxic in high concentrations. The European Union therefore introduced restrictions at the end of 2005, limiting for the first time the quantity of pure copper that can be applied in organic farming to eight, and later six kilogrammes per hectare and per annum. Under the guidelines of individual organic associations, the limit is in some cases set at just three kilogrammes. In an effort to identify alternatives to copper, or at least to reduce the quantities in which it was applied, BÖLN launched a joint project pooling the expertise of six viticulture institutes from across Germany.

Alternative substances tested

In their search for alternatives to copper, the researchers examined around 60 substances such as rock flours, vegetable oils and extracts as well as various bacterial preparations under defined greenhouse conditions. The most successful test substances were subsequently examined on test fields and then used under real-life conditions on organic pilot vineyards.

Among the products tested, the most effective against the *Plasmopara viticola* pathogen were the rock flour Myco-Sin® VIN, ROCKSIL® and Frutogard® as well as the soil additive Kendal®. Each of the products in question was combined with copper preparations. In cases of low and medium-level infestation, these substances helped to reduce the copper application rate to much less than three kilogrammes per hectare per year. For example, in the pilot vineyards, a combination of Myco-Sin and Kendal used together with subsequent copper treatment to control a mild case of infestation limited the overall quantity of copper applied to between 1.6 and 1.8 kilogrammes per hectare per year.

When the level of infestation ranged from high to severe, however, none of the alternative substances were sufficiently effective any longer. Considerable losses in yield and quality were recorded even though the active ingredients had been used. The researchers therefore believe that cultivation is not economically viable in cases of severe infestation unless the application rate of copper is more than three kilogrammes per hectare per year. Nevertheless, they see enormous potential for continuing to enhance the effect of alternative treatment, for instance by improving either rain resistance or miscibility with copper-containing preparations.



Environmentally neutral rock flours can keep leaves and vines healthy in cases of low to medium-level infestation.



The positive findings in the case of low to medium-level infestation were immediately applied in practice. Thanks to numerous field days and the involvement of expert advisors, who incorporated the findings directly into their recommendations, the new strategies for treating downy mildew soon became established on organic wine farms, including in neighbouring countries. Furthermore, they provided valuable support to the arguments put forward in the strategy paper on the use of copper as a pesticide with particular regard to organic farming.

Copper will remain absolutely essential to organic farming for the foreseeable future. In order to keep the rates of copper application as low as possible, a copper minimisation strategy was developed by various research institutes and professional associations as far back as 2008. BÖLN supports this strategy by encouraging and coordinating numerous research projects.



Further reading: these and other BÖLN studies

- Improving organic vine protection with particular regard to vine peronospora. Initial findings from the participating pilot farms
www.orgprints.org/15294/
- Management of black rot in organic viticulture
www.orgprints.org/17072
- Organic grafted vines – ways of production and distribution
www.orgprints.org/17320

Tapping latent potential –

research into breeding the key to successful crop production

Seeds are a fundamental means of production for every farmer. The genetic potential of the variety of seeds sown is crucial to the success of the crop. This is why breeding is a key technology for the future of agriculture of tomorrow, not just in organic farming. Consumers too are increasingly recognising the importance of breeding, while at the same time the use of genetically modified breeding methods – from which organic farming clearly distances itself – comes under a growing degree of critical scrutiny. Furthermore, many consumers expect organic fruit and vegetables to have been grown using seeds that have been produced organically.

Nevertheless, in the area of organic breeding in particular, many obstacles have existed and continue to do so. For a long time, the range of varieties was very limited. Moreover, the properties of most varieties are geared to meeting conventional needs. In this regard, the requirements in organic farming differ greatly: for example, the nutrient supply to organically grown crops is much smaller, while weeds and pests – for which there are no chemically synthetic pesticides available – are other factors that they have to contend with. For a long time, the specific requirements of organic farming were not taken into account, even when conducting variety testing.



This explains why, in its initial phase, BÖLN mainly supported projects which addressed issues regarding resistance in arable, vegetable and fruit crops or selection in nurseries under organic farming conditions. Among other things, the focus of these projects was on resistances to diseases and pests, or a weed tolerance. In later projects, the aim was to increase the number of varieties and to expand the range of species while also aligning these more closely with the requirements of organic farming.

The intensive research work paid off. At the end of 2013, for instance, many new approved varieties of a whole range of different crops became available for organic farming. In addition, the process for registering more cereal cultivars which can be grown in the next few years is underway.



More protein from domestic farmland – research project to expand soy bean cultivation in Germany

The demand for soybeans as food and animal feed is global. Although the plant prefers warm locations, profitable cultivation of soybean is already possible in southern Germany. There are many reasons for wanting to increase domestic soy cultivation. An extensive research project was therefore set up with the aim of expanding cultivation and also establishing cultivation in less favourable locations.



Field days allow farmers and advisors to learn about the current state of research into soy.

The idea of soybeans grown on German farmland continues to have an exotic ring to it. As a plant which prefers the warmth, it is grown primarily in South America, in the southern United States and in Asia. However, in Bavaria and Baden-Württemberg too, a number of farms have been growing soy –successfully in most cases – for several years now. In 2013, the area under soybean cultivation was roughly 7,000 hectares.

Good arguments exist for expanding soy cultivation in Germany further. Demand for regionally produced soybeans, both as animal feed and for the production of tofu, is increasing steadily, thereby offering many farmers a potentially interesting alternative source of income. Organic livestock farms and food producers in particular are also interested in using genetically modified soy or growing the plant themselves. For organic farms especially, this is of major importance as from 2015 onwards they have only been permitted to use 100 percent organic animal feed. Further advantages include the improvement in crop rotation thanks to soy and the benefits it provides as a preceding crop.

Strengthening soy cultivation at all levels

A three-year interdisciplinary project was carried out in order to facilitate soybean cultivation in Germany's more northerly federal states. The aim of the project was to breed early-ripening, day-neutral, high-yielding and high-quality genotypes, with lower warm sum requirements, high weed suppression and tolerance, improved biological N2 fixation and good ripening behaviour. To achieve this aim, at the same time a number of different soy varieties and *Bradyrhizobia* strains were selected for their improved symbiosis and nitrogen fixation in cool soil temperatures. The researchers developed cultivation measures which can be used to accelerate the development of young crops and extend the vegetation period. The downstream sectors of soy production, such as the processing of soy as animal feed or tofu, were key components of the project as well.

Successful breeding

In nationwide trials of different varieties conducted at 39 separate locations, an average of just under 27 quintals per hectare were harvested in the north, compared to around 35 quintals per hectare in areas in central and southern Germany. The breeding activities produced 17 promising strains, which have already been distributed to commercial plant breeders. The tests on chilling tolerance revealed major differences between the varieties in terms of their ability to return good yields following chilling stress in early stages of growth.



Locations of soy variety trials (2011-2013) which were assessed as part of the BÖLN project.



Varieties with significant compensation potential often had the disadvantage of ripening much later, sometimes up to 35 days later. However, some varieties were able to compensate well for chilling stress without any material delay in their ripening. The researchers believe that these varieties are essentially suited to cultivation in cold regions.

Working together with the laboratory tofu facility developed in the project, a breeding instrument was created. In the current breeding process where small quantities of soybeans are used (80 g/sample), this instrument provides information on the processing characteristics required to make tofu and will, in future too, therefore be able to support the further development of early-ripening varieties of tofu soy for cultivation in Germany.

Factors underpinning successful soy cultivation

In locations which are not conducive to soy cultivation, such as in Osnabrück and Kassel, issues of an arable farming nature regarding the early emergence of varieties/genotypes were examined, as was the impact of technical measures (pre-soaking, cultivation under unwoven fabric or plastic film, ridge planting, compost) on continued phenotypic development; direct seeding and sulphur supply requirements were also examined. In this regard, a one-year trial using biologically degradable plastic film as protection against the cold during the early stages of growth proved to be extremely promising. However, whereas this produced a yield of 36 quintals per hectare, which is very high for the region, the additional costs incurred per hectare ranged between EUR 200 and EUR 300. The overall assessment was that a variation of seeding time and various techniques for achieving early emergence of soy have no bearing on yield. Weed control using a torsion hoe, finger hoe and ridge attachments produce comparable levels of success, while growing soybeans on ridges is also a good way of controlling weeds.

Soy processing concepts

Short heat treatment using steam (10 minutes at 100°C followed by expansion (pressure treatment)) proved ideal when processing soy. This heating process is required to destroy any enzymes in soy-based animal feed that prevent digestion. A standard grain size which can be achieved either by crushing or by using a sieve is important in order to achieve optimum results when processing soybeans. However, tests carried out on the use of waste heat from biogas for processing showed that the unfavourable heat distribution and the length of time required for this treatment damages the proteins that processors wish to obtain. A handbook on full-fat soy and soybean cake was compiled to provide farmers with information on the use of domestic soy-based feedstuffs.

Innovative approach to research

The research project considered the requirements of organic farming and conventional agriculture in equal measure. One particular feature of the project was its innovative approach to research which saw nine different state agencies and research institutions

work hand in hand throughout the entire trial period. Practitioners on the ground also derived key findings from considering the value chain, most notably processing. Given that agricultural enterprises and representatives of the soy processing industry were also involved in the project from the outset, the findings are particularly relevant to actual practice. Furthermore, knowledge transfer was a key element in the project design. Activities in this area is included preparing free information materials on soy cultivation and how to use soy as an animal feed, numerous field days and farmer workshops as well as the website www.sojainfo.de – now integrated into the website www.sojafoerderring – as a central source of information.



More domestic leguminous crops as a cornerstone of sustainable agriculture:

The protein crop strategy of the Federal Ministry of Food and Agriculture

The Federal Ministry of Food and Agriculture (BMEL) is looking to actively promote the cultivation of domestic leguminous crops and their use as food and feedstuffs. It aims to achieve this objective through the protein crop strategy. The strategy focuses on promoting the cultivation and use of leguminous crops across the entire value chain. An increase in research in leguminous crops, which is to be greatly stepped up in the area of breeding in particular, is a cornerstone of the strategy. Moreover, exemplary demonstration networks are designed to improve exchange between researchers, farmers, processors and commercial representatives. The networks will be closely interlinked with the research projects so as to enable new impetus from both sides and to promote the cultivation of soy in Germany. The interdisciplinary BÖLN-backed joint research project on expanding soy cultivation is cited as a flagship project in the protein crop strategy on account of its innovative nature.





Further reading: these and other BÖLN studies

- Expansion of soybean cultivation in Germany through adaptation by breeding as well as optimization of crop production and processing technology
www.orgprints.org/19821/ and www.sojainfo.de
- Exemplary demonstration network for expanding and improving cultivation and utilisation of soybeans in Germany
www.orgprints.org/23512/
- Development of winter pea prototypes (*Pisum sativum* L.) in mixed cropping under conditions of organic farming (joint project)
www.orgprints.org/18142/
- Increase of the agronomic importance of yellow (*Lupinus luteus*) and white lupins (*Lupinus albus*) for organic farming by breeding methods
www.orgprints.org/19387/
- Ensuring and improving the availability of organically produced red clover seed by the development of selection methods in respect of seed-borne and soil-borne fungal diseases with the aim of breeding sustainable resistant varieties
www.orgprints.org/15778

Focus on animal welfare – new methods for enhancing animal health

Modern and effective management are essential for long-term and profitable animal husbandry. Identifying the weaknesses of a farm, drawing conclusions and taking the necessary corrective measures are the basis to running a successful operation. At the same time, public interest in animal health and welfare is growing and animal husbandry methods are being called into question. Consequently, animal welfare and animal health have been central elements of BÖLN-supported research projects for quite some time now.

In this regard, it is vitally important that research findings are ultimately translated into practice. Implementing the latest findings is a core element of successful farm management. The development of a farm is influenced greatly by the advice which it seeks. Innovative strategies are needed, that have been developed and put to the test within the framework of BÖLN.



How healthy are dairy cows in organic farming schemes?

The largest interdisciplinary study carried out to date on this topic examined the health of dairy cows on 106 organic farms across Germany. Farm managers were given recommendations on how to improve animal health and the outcomes were scientifically examined during the course of the study.



For a long time there was no reliable data on animal health in organic dairy farming.

For a long time, there was barely any data available on the extent to which organic dairy cows are healthier than conventionally reared animals. An interdisciplinary research project provided a first ever representative overview on the state of animal health on organic dairy farms. Researchers, veterinarians and advisors together examined a total of 106 organic farms, focusing on all the parameters which provide indications regarding the health of dairy cows.

On every farm, project staff inspected the data contained in herd-books and the results of milk inspections, carried out cyto-bacteriological analyses on quarter milk samples and assessed the physical condition of the cows. The milking routine, husbandry system – including animal housing requirements – and feeding management were also assessed. A characteristic feature of the project was that the data collected was used as a basis on which to identify individual weaknesses of the farms and to issue farmers with recommendations on how to solve existing problems.

The study revealed huge differences between individual farms. In many cases, farmers recorded significant improvements by following the recommendations and implementing changes consistently.

The most important findings in a nutshell

The following causal chain provides a concise description of the outcome of the study: 'management – animal welfare – animal health – product safety and quality'.

Good management is the basis for successful farming – the expertise of animal breeders and farm managers, their attentiveness and their willingness to take action safeguard the high quality standard of milk production and place it on a sustainable footing. Only healthy animals feel secure and are able to do what is expected of them. As a result, the somatic cell count in milk and the mastitis incidence rate was lowest in well-managed farms where the hygiene requirements for livestock housing is rigorously adhered to. Metabolic disorders such as acidosis and abomasal displacements, parturient paresis and milk fever occurred much less frequently in the well-organised farms where keepers take excellent care of their animals.

However, it is not only the management of the farm itself but the upstream and downstream sectors as well that have an influence on the success of dairy farms. It was therefore important to structure the research project in an interdisciplinary manner and to integrate all of the parties involved in the process of milk production. Extension services in particular play a central role here as they communicate up-to-date knowledge and recent findings. Veterinarians also transfer this knowledge when attending to cattle stocks and treating acute diseases, whereas research focuses on outstanding issues and develops new solutions. Extensive new results were generated from all of the individual findings and from the close cooperation of the actors working within the project.

These are summarised in a guidance document which – in a very thorough and solution-focused manner – provides rapid assistance to farmers so that they can help themselves.



Demeter farm owned by the Spies family

Sommersdorf/Mecklenburg-Western Pomerania

66 cows

Rigorous hygiene brings success

Tests conducted by the researchers revealed that there was room for improvement on the Spies family farm in terms of udder health. Almost three quarters of all lactating cows were diagnosed with a subclinical mastitis (somatic cell count of more than 100,000). The herd's average somatic cell count was 275,000. Another striking feature of the findings was the high proportion of heifers with infected udders. With the aid of the researchers, farm owners Anke and Michael Spies began implementing a comprehensive hygiene programme.



The resting area inside the cattle housing is now consistently bedded twice a day, for heifers sometimes even three times per day or more, depending on what is required. They also separated the feeding and resting areas. Anke Spies and the milker they employ always wear gloves during milking. After every milking, gloves and teat cups are disinfected using peracetic acid. They also introduced teat dipping. The improved hygiene levels produced rapid results. Within two years, the proportion of cows with subclinical mastitis fell to below 30 percent and only eight percent of all animals were infected. A sharp increase in the healing rate was also recorded despite the fact that Anke and Michael Spies do not use dry cow therapy or administer any other antibiotics.

Bioland farm owned by the Reichert family

Korle, North Hesse

66 cows

Everything revolves around feeding

Despite high milk production figures, the data collected for the herd belonging to the farm's owners, Mr and Mrs Reichert, revealed several problems. On average, 14 percent of their cows had to be treated by the veterinarian for milk fever – a figure which is well above average. Cases of subclinical ketosis (lack of energy) at the start of lactation as well as fertility disorders such as retained placentas and irregular oestrous cycles occurred on a much more frequent basis than average. Managing feeding correctly was the key to solving almost all of these issues. From their very first visit, researchers found that dry cows were over-conditioned. As a result, they were separated from the lactating cows and were given a ration which was much lower in energy. The proportion of animals with subclinical ketosis fell while herd fertility also improved markedly during this period. Whereas previously almost one in three cows had to undergo treatment for corresponding disorders, the ratio of cows in treatment fell by half, to under 14 percent. The falling trend in the number of cows infected with milk fever was particularly positive. The crucial measure here was to stop feeding dry cows clover-grass silage, which is extremely rich in calcium. In addition, all cows entering their third or later phase of lactation, were given prophylactic treatment in the form of a calcium bolus following calving. Both measures combined resulted in a fall in the number of cases of milk fever to below two percent.



Further reading: these and other BÖLN studies

- Health and performance of dairy cows in organic farming from an interdisciplinary point of view an (intervention-) study on metabolic disorders and mastitis with regard to forage production, feeding management and husbandry practices (joint project)
www.orgprints.org/11117/
- Information sheet on udder and metabolic health in organic dairy cows
www.fibl.org/de/shop/artikel/c/rindvieh/p/1580-milchviehgesundheit.html
- Development, testing, implementation, and evaluation of strategies concerning animal health, keeping, feeding, and management in organic piglet production
www.orgprints.org/19173/
- Status quo of animal health in organic animal husbandry – conclusions and options for action in agricultural policy
www.orgprints.org/5232/



An intelligent way to control parasites at grazing

Farm animals should be turned out to graze. In organic farming in particular, this is virtually a must. But while grazing improves animal health, it also increases the risk of contracting unwanted infections from parasites on grazing land. A newly developed online tool, the decision tree, helps farmers to significantly lower the risk of infection to their herd.

Plenty of light, fresh air and lots of space in which to move freely – a wide expanse of grazing land for young cattle, suckler cows, sheep and goats embodies the organic farming principle of animal-welfare oriented husbandry. However, this way of farming, which is in line with animal welfare requirements, also has its drawbacks. Eating fresh grass may cause animals to ingest unwanted parasites such as gastrointestinal worms, roundworms or lungworms which, if they cause infection, may result in economic losses through slower cattle growth or reduced milk production, for instance.

WEIDEPARASITEN

Sie sind hier: Startseite

Entscheidungsbäume

- Erststümmige Junggrinder
- Mutterkuhhaltung
- Schafe
- Ziegen
- Glossar

Willkommen

Diese Seite bietet Ihnen Informationen rund um die Kontrolle von Endoparasiten der Wiederkäuer mit Weidegang. Für erststümmige Junggrinder in intensiven Milchviehbetrieben, für die Mutterkuhhaltung und für die intensive Schaf- und Ziegenhaltung wurde je ein Entscheidungsbaum entwickelt, um Landwirten und Tierärzten Empfehlungen für eine optimale Wurmbekämpfung zu geben. Ziel ist es, durch Hinweise auf das Weidemanagement und den Ablauf der Parasitenentwicklung, den Einsatz von Tierarzneimitteln zu minimieren ohne die Gesundheit und das Wohlbefinden der Tiere zu beeinträchtigen.

Dies gelingt unter Einbeziehen einer vorausschauenden Weideplanung, welche die Entwicklungszyklen der Parasiten und die Immunitätsentwicklung der Wirtstiere berücksichtigt.

Vieelfältige Informationen über die Biologie der Parasiten, Immunitätsentwicklung und Tierarzneimittel begleiten den Nutzer durch den Entscheidungsbaum.

Diese Seite erhebt keinen Anspruch auf Vollständigkeit.

Wollen Sie keinerlei Entwarnung bei Ihren Tieren zulassen, sind diese Entscheidungsbäume in der Regel nicht geeignet das Tierwohl sicher zu stellen. Sie müssen dann speziell auf Ihren Betrieb abgestimmte Maßnahmen ergreifen.

Um nah an der Praxis zu sein, sind wir für Fragen, Kritik und Anregungen, insbesondere von Landwirten und praktizierenden Tierärzten dankbar. Bitte schicken Sie eine entsprechende Mail mit Ihren Anmerkungen an: regina.koopmann@ili.bund.de

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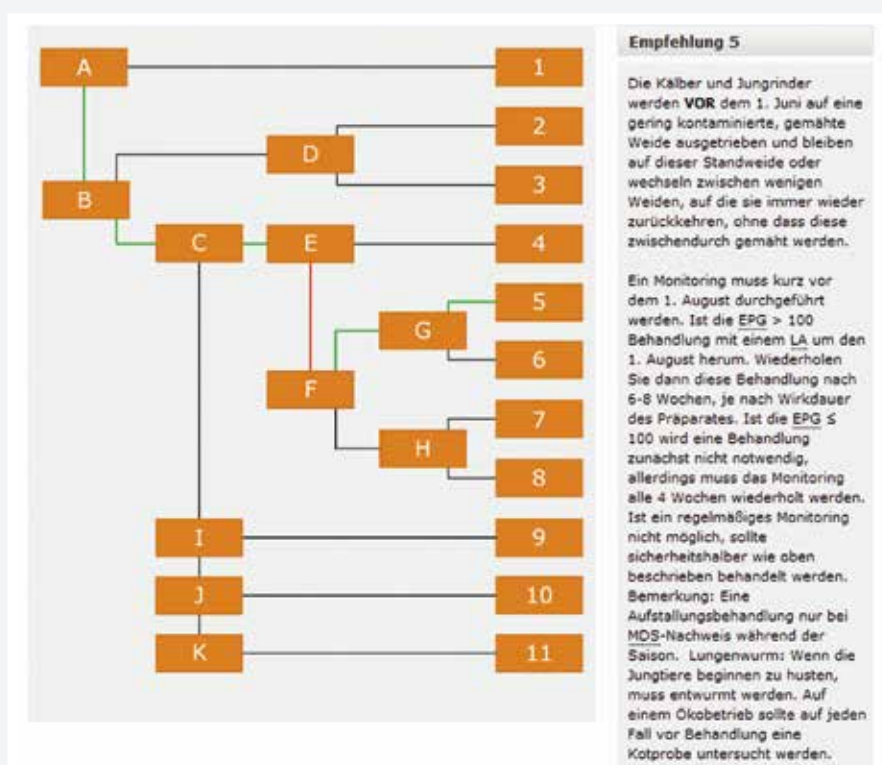
THÜNEN

Little leeway for controlling parasites

There are only a limited number of ways in which existing infections can be treated. As a general rule, organic farmers too must resort to chemical agents (anthelmintics) to cure infected animals. In theory, the risk of infection may also be reduced by means of clever grazing management and regular controls of faecal egg output. Yet in practice, many farm managers lack the necessary expertise and the knowledge about parasite biology.

Yes/no answers guide the way

Researchers from the Thünen Institute (TI) of Organic Farming in Trenthorst have developed an online decision tree to plug these knowledge gaps and to provide farmers with a simple tool for preventive grazing management. The system can be used online free of charge and is based on questions relating to the grazing practices of individual farms which users can simply answer with 'Yes' or 'No'. For instance, questions deal with the duration of grazing or how often animals rotate between different grazing areas. Each answer leads the user via further decision pathways to a clear recommendation which is tailored towards the individual circumstances of each farm. Farmers learn, for example, whether their pastures may be infested with certain parasites, when the best time is for grazing or moving their herd to different pasture land or at what stage they should treat their animals with anthelmintics.



Fewer anthelmintics = fewer resistant strains

The decision tree can help farmers to harmonise any treatment that is required with their grazing management in the best possible way. Targeted monitoring also ensures that animals are only treated if really necessary, thereby enabling the farmer to meet another objective of organic farming by considerably reducing the rates of application. Smaller application rates are also desirable for other reasons: first, they help to lower the risk of strains developing a resistance to the available active substances; and second, moderate use of active substances can lead to animals developing an immunity, which in turn contributes greatly to economically-efficient grazing.

Monitoring skills

The website also provides farmers with the skills they need to monitor parasite infestation in a professional manner. Users learn when to take samples, how to pack them correctly for laboratory testing and how to interpret the results. Knowing about the biology of the most common parasites and how they behave under certain weather conditions is equally important. The website therefore offers further comprehensive explanations on the life cycle of the pathogens and on ways to diagnose and prevent an infection.

Farmers and other interested parties can access the online decision tree free of charge at www.weide-parasiten.de (available in German only). It provides information on the grazing practices of young cattle, suckler cows, goats and sheep.



The users' opinion counts

In order to structure the decision tree so that it is as easy as possible to understand and is also of maximum relevance in practical terms, potential users – primarily farmers and veterinarians – were asked to complete a questionnaire so as to gauge their views of the system. For 84 percent of respondents, the specialist information contained on the website was easy to understand, and 72 percent were provided with suggestions on how to treat their animals. At least 63 percent of respondents used the system as source of reference for decisions regarding farm operations, while 61 percent used the programme specifically for the purpose of controlling parasites on their own farms' grazing land. Among the reasons given by respondents who did not use the decision tree was the fact that they were unable to directly replicate their farm online or that they leave the treatment of their animals to their veterinarian. However, the majority of respondents welcomed the benefits that the system brings and the opportunity it provides to be able to reduce treatment involving medication and to prevent resistant strains from developing.

New media also offer new possibilities for managing animal health on farms. For some time now, BÖLN has therefore been successfully promoting projects aimed at developing web-based programmes on animal husbandry which farmers can use free of charge.



Further reading: these and other BÖLN studies

- Supporting the control of internal parasites in ruminants by decision trees
www.orgprints.org/21663/
- Economic analysis of a management tool for the improvement of laying hen health on organic farms
www.orgprints.org/16578/
- Development of preventive measures for the promotion of health and longevity in sheep on organic farms
www.orgprints.org/21641/
- Monitoring of udder health as preventive tool for the improvement of udder health in dairy goats (joint project)
www.orgprints.org/16780/



Learning from other farmers – the Stable School project

Stable School is the name of a new advisory concept in organic dairy farming. Developed in Denmark, the concept was modified and then tested under real-life conditions as part of a BÖLN project. The principle of the concept is that farmers discuss and solve problems on their own farms with other farmers. A research project carried out on this new concept shows that farmers consider this new form of extension service to be of valuable assistance.



The Stable School concept brings farmers together to share advice.

Although there is no shortage of such services for dairy farmers, the standard offering of information events, workshops or support from external consultants have some disadvantages. Often they do not take the individual problems of a farm into account, they focus too heavily on theoretical aspects or do not encourage the participants to take action as they tend to offer instruction rather than support.

The Stable School, an advisory concept which has been applied successfully in Denmark for a number of years now, aims to address these shortcomings. Researchers from the Thünen Institute for Organic Farming in Trenthorst have introduced and evaluated a modified version of the Stable School as part of a two-year BÖLN pilot project carried out on 20 organic German farms.

External moderator ensures goal-oriented discussions

The primary role of the concept is to bring together on a regular basis a group of up to six dairy farmers who can then share their experiences in as open a manner as possible. Unlike the usual workshops, these discussions are also guided by an external moderator, usually a specialist advisor, who notes down all the outcomes of the talks. The moderator only steps in to provide expert advice at the express wish of the group.

Another characteristic feature of the concept is that the participating farmers take turns in visiting each other's farms to hold their meetings. Prior to each meeting, the host farmer and the moderator together prepare an overview of the farm including all key performance indicators. The information compiled includes, for example, the results of milk production tests and records from herd books but also provides data taken directly from the animals, such as the body condition scores (BCS) of cattle. The hosting farmer can also put items on the agenda that he would like to discuss in relation to his farm.

Every meeting begins with an extensive visit of the host farm. This, together with the data compiled in advance, allow the other farmers to get an excellent idea of the host farm, analyse its strengths and weaknesses and to develop solutions to the issues raised.



An extensive visit of a farm is part of each Stable School meeting.



Farmers have a very positive view of the Stable School

At the end of the project's first year, the farmers were asked to assess the practical benefits of the meetings. Almost two thirds of the participants had fully or at least partially implemented the recommendations that were given during the meetings. Only a quarter of all suggestions went unconsidered following the joint meetings.

When asked to assess the value of the meetings for their own farm, 17 out of 20 participating farmers considered them to be of 'very high' (9) or 'high' (8) value. In terms of improving animal health in particular, 15 farmers considered the solutions that were developed to be of 'great benefit' for their own farms. The most common topics turned out to be udder health problems, metabolic disorders, feeding practice and the rearing of calves.

All in all, the new advisory concept was deemed to be very positive. Thirteen farmers thought that the Stable School was 'very good' and seven thought it was 'good'. They particularly enjoyed being able to share their experiences within the group, develop practical solutions together and draw on the external inputs associated with visits to other farms. The motivation to implement changes was an important aspect of the concept for its participants. Accordingly, almost all farmers (19) praised the Stable School for being 'much more motivating' (10) or 'more motivating' (9) than other extension services. However, two aspects which were criticised by farmers were the amount of time it took them to visit some of the other farms in their group and the insufficient level of moderation of discussions in some cases.

The overall very positive assessment of the concept was also reflected in the willingness to pay for an external moderator, with all participants willing to pay for future Stable School meetings. The annual sums mentioned varied between EUR 100 and EUR 1,800 and half of the farmers would be prepared to pay EUR 400 per year. This is considerably more than the figure of EUR 250 that most of the participating organic farmers are currently spending on dairy extension services.



Views of the participating farmers

Nicola Burgeff, Demeter dairy farm in Mahlitzsch, Saxony

"Thanks to all the data that you are given prior to each visit, you are automatically thinking along the lines of the host farm and understand the problems it is having. That is a major benefit of this concept. However, the group is also aware of issues that are not on the agenda, which is also extremely helpful. And there is no instructor within the group. All of the participants discuss matters on an absolutely equal footing and respect the practical experience of the others in their group. That way, you are then happy to take advice on board."

Josef Schlüter, Bioland dairy farm in Ottbergen, near Höxter

“In my group, the focus is very much on the bare figures. What I found extremely appealing about the Stable School concept was therefore its practical aspect. As all of the other farmers prepare for the farm visit in advance, everybody was automatically aware of the relevant issues and could discuss these face to face during the visit itself. Whenever I walk through my animal housing after a meeting, I take a closer look at many things and often think about the advice I was given on certain topics. That is really good for making you aware of things that you would normally not see. For all these reasons, the Stable School is a valuable help that I would hate to be without.”

Organic farming is known for its unconventional approaches to production, extension services and marketing. The support provided to this project by BÖLN helped to deliver scientific proof that such approaches work well – even in areas of conventional farming.



Further reading: these and other BÖLN studies

- ‘Stable Schools’ in German organic dairy farming – a pilot study on a concept for animal health and welfare promotion.
www.orgprints.org/18123/
- Minimising medicine use in organic dairy herds through animal health and welfare planning (2007–2010)
www.orgprints.org/18774/
- Studies on the prevalence of Escherichia coli pathovar-induced diarrhea in newborn piglets in organic piglet producing farms
www.orgprints.org/16603/
- Trial implementation and evaluation of management tools to increase animal health and consumer protection in organic pig production
www.orgprints.org/16659/



Holistic concepts of quality – balancing tradition and innovation

Organic farming is characterised by a holistic understanding of quality at all stages of the value chain. The quality of organic products is, accordingly, reflected in the entire process chain, from environmentally sustainable production and animal-welfare oriented husbandry to the careful processing of resources. The aim is to achieve high-quality and healthy food which has a natural taste and is rich in valuable nutrients. Tried-and-tested, traditional production methods are just as important here as innovative techniques, and manual skills are just as important as sound expertise. One question which links all of these areas together is: what actually constitutes careful processing?

From the very start, BÖLN focused its attention on matters such as the processing and quality of organic food and on the expectations that consumers have of these products. BÖLN has funded a large number of studies and projects covering a range of issues including patterns of consumption and dietary habits among organic customers, the reduction in the use of nitrite pickling salt in meat processing, and methods for analysing the authentication of organic products.



As the Federal Scheme has been extended to look into other forms of sustainable agriculture, future research and evaluations will focus even more on sustainability in the areas of resources and technology, including the field of food processing.

What kind of people buy organic produce? Very much a lifestyle choice

Dietary habits have a direct impact on what consumers buy and, ultimately, on how much they are willing to spend for their food. This applies to organic food as much as it does to the conventional food sector. Based on the National Nutrition Survey II, researchers from the Max Rubner-Institut and the University of Göttingen examined the dietary habits and health-related behaviour of consumers of organic products. The analysis of organic food consumption is based on behaviour and lifestyle. It therefore characterises organic buyers in all of their aspects and provides recommendations not only for the organic food industry but also for policy and consumer advice services. In the field of organic food, the above survey is the most frequently quoted academic paper in specialist journals and general-interest media.

According to the survey, buyers of organic products are generally more environmentally conscious and have a better knowledge of food and nutrition. This is also reflected in their lifestyle: on the whole, their diet is more balanced and they lead a healthier life compared to people who do not consume organic products. Underpinning these findings is a very comprehensive database which is unique in terms of its complexity and extent. Within the framework of the National Nutrition Survey II, more than 13,000 participants between the ages of 18 and 80 provided precise details of their dietary habits and their choice of food, thereby contributing to the most extensive database which has ever been created in Germany. Experts used this data, collected between November 2005 and December 2006, to ascertain not only the respondents' nutritional status but also – given the particular focus on organic buyers – their buying motives and their lifestyle.

Women are more inclined to buy organic food

In terms of shopping, a very clear gender-specific pattern of behaviour emerged: far more women than men choose organic products (61 percent as against 39 percent) However, clear differences were also apparent in the two groups of buyers in terms of age structure: more than half of all those people buying a considerably higher volume of organic produce are older than 50. This shows that traditional, regular organic customers are gradually getting older. The youngest consumer group (18 to 24 years old) is least interested in buying organic products.

However, the decision in favour of or against buying organic food is not related to family status or size of household. Instead, social status and income are much more relevant factors. In general, people from the professional classes and higher earners are more inclined to buy organic food; a full 60 percent of organic customers belong to the upper middle class or upper class. But also those on a smaller income treat themselves to organic products every now and again. Members of the lower class nevertheless make up four percent of this group of buyers, with the majority of them being women over the age of 65.





More women than men buy organic products.

Organic customers lead a healthier lifestyle

Organic customers lead a more active lifestyle, sleep better and smoke less than people who do not buy organic products. They also pay more attention to having a balanced diet in terms of their food choices. Although not all of them meet the consumption levels recommended by the German Nutrition Society, organic customers generally eat more fruit and vegetables and consume less meat and fewer sausages as well as fewer sweets and fizzy drinks. As a result, their fibre intake as well as that of other important nutrients such as folate, calcium and iron, is higher on average, and even more so the more often they consume organic food.

Organic customers are better informed

Organic customers are much more interested in health issues. A test carried out by researchers into consumers' knowledge levels also revealed that 39 percent of organic customers have a good level of nutritional knowledge compared to just 23 percent of non-organic customers. As a general rule, organic customers assess food quality much more critically and, compared to non-organic customers, tend to consider factors such as genetic engineering, radiation, additives and pesticide residues as bearing a risk. Conventional-minded consumers, on the other hand, are more concerned about 'natural risks' stemming from food that has gone off, natural toxins or raw food.

Different reasons for buying organic food

Researchers consider an awareness of sustainability as being the most important factor influencing the degree to which customers buy organic food, together with an ethical lifestyle and a greater awareness of health issues. People who care about the environment and animal welfare, who attach importance to fair trade, environmental packaging, the regional origin and seasonal availability of products and who are opposed to genetically modified food, purchase organic products more frequently. Nutritional awareness and a preference for specialities and brand products, combined with the willingness to pay a higher price, are the reasons next in line for buying organic products. By contrast, non-organic buyers tend to be satisfied with buying standard off-the-shelf products and shy away from the added effort and cost involved in buying and preparing organic products. The desire for convenience food is even more pronounced among men.

All in all, the data from the National Nutrition Survey paint a detailed picture of the dietary habits and the lifestyle of organic buyers: according to the study, the consumption of organic products, lifestyle and dietary habits (little meat, plenty of fruit and vegetables) are closely linked to one another. Nevertheless, researchers see a growing market potential for organic meat, especially among those male customers who buy a higher than average volume of organic products. In terms of organic meat products, researchers therefore recommend communicating the particular benefits of animal welfare-oriented husbandry much more strongly.



Plenty of fruit and vegetables and little meat – organic customers know what constitutes a balanced diet.

Altruistic buying motives apart, researchers have found that health-related aspects provide the most important arguments in favour of buying organic products. Consumers associate eating organic food with additional health benefits. However, the marketing strategies of the organic sector focus more on other aspects. The holistic approach which was originally characteristic of organic farming is now only of marginal importance. The marketing strategies of organic producers barely feature any statements on nutritional or health matters. Conventional food producers, however, spotted this trend at an early stage and responded by focusing on the additional health benefits that their products bring and by providing the corresponding offerings to promote customer



health. It is even more important for the organic food industry to focus increasingly on marketing the health-oriented aspects of organic products. Researchers believe that a range of products and services which have been shown by experts to promote a balanced diet and a healthy lifestyle is way of strengthening customer loyalty and of tapping into new groups of customers for organic products.



Views from the organic sector

Views from the organic sector

Dr Felix Prinz zu Löwenstein, Chairman of the German Association of Organic Farmers, Food Processors and Traders (BÖLN)

“Organic customers eat more healthily and also know more than non-organic buyers about what constitutes excellent nutrition – we always guessed that this was the case but the study on organic buyers carried out by the Max Rubner-Institut and supported by the Federal Scheme for Organic Farming now provides scientific evidence of the fact as well.”



Further reading: these and other BÖLN studies

- Data Interpretation Based on the German National Nutrition Survey II (NVS II): An Integrative Analysis of Behavioural and Lifestyle-Related Factors for Organic Food Consumption
www.orgprints.org/18055/
- Purchasing barrier price? – Analysis of the willingness to pay and the purchasing behaviour on organic products
www.orgprints.org/15745/
- German consumers’ preferences and willingness to pay with regard to organic wine
www.orgprints.org/21075/
- Infrequent and occasional buyers of organic products
www.orgprints.org/4201/

Curing agents in organic meat products – more than a sensory matter

Authorisation to use sodium nitrite in the curing of organic meat products has long been an issue under scrutiny. This situation is reflected in BÖLN which has provided funding for a number of research projects and training measures relating to the topic of curing agents. The debate on the pros and cons of curing agents revolves not only around aspects of hygiene and production technology but also marketing issues.



A broad range of organic meat and sausage products

Foregoing curing salts in traditional methods of sausage production is virtually inconceivable as the salts not only preserve the meat but also give it colour to make it look appetising. The fact that there are doubts about the safety of curing salts as regards people's health means that they are the subject of controversy in the organic food industry. Efforts are therefore being made to reduce the use of curing salts or, wherever possible, to forego them entirely. However, uncured sausage products are grey and lack the distinctive aroma of cured products. According to experts on organic markets, these sensory features of uncured meats to which most consumers tend to be unaccustomed may prevent 'new organic customers' in particular from buying uncured organic sausage products. Most consumers would associate the grey colour with food that has 'gone off' or is 'inedible'. As a result, it would require an enormous effort in terms of communication at the point of sale to make consumers more willing to buy meats.

However, a joint study carried out by the German office of the Research Institute of Organic Agriculture (Forschungsinstitut für biologischen Landbau Deutschland e.V.) and the University of Kassel, found that acceptance of uncured meat products is greater than was previously assumed. Applying a comparative sales analysis, researchers examined the consumer acceptance of three different sausage products of varying quality (produced conventionally, organically with curing agents, organically without curing



agents). The analysis was conducted in cooperation with kff kurhessische fleischwaren GmbH and the tegut retail chain. Researchers organised sales tests in six selected tegut supermarkets where they analysed the sales of organically and conventionally produced brawn, ham sausage and ring bologna over a period of twelve weeks.

Increase in sales of uncured sausage products

The newly developed uncured varieties were very well received by tegut customers. The nitrite-free varieties accounted for as much as one third of overall organic sausage sales during the trial period. An average of 26 kilogrammes were sold per week during the product launch phase, before levelling off at an average of 18 kilogrammes per week thereafter. The introduction of uncured meat products in the test supermarkets also impacted positively on overall customer demand for organic sausage products. All of the tegut supermarkets in which uncured sausage products were available recorded a sales increase of 10 percent measured across the entire range of organic sausages. The researchers see these figures as a clear indication of the effect that uncured organic products have in terms of increasing food retail sales. However, looking at the market as a whole, researchers do not expect these positive test sale results in the tegut supermarkets to carry over in full to other retailers. They believe that the lack of acceptance both on the part of customers and sales staff in other retailers, together with the limited shelf life of uncured sausage products will be problematic. As a result, the presumption is that only sausage products which enjoy high sales would stand a chance of being listed by conventional retailers or discounters.

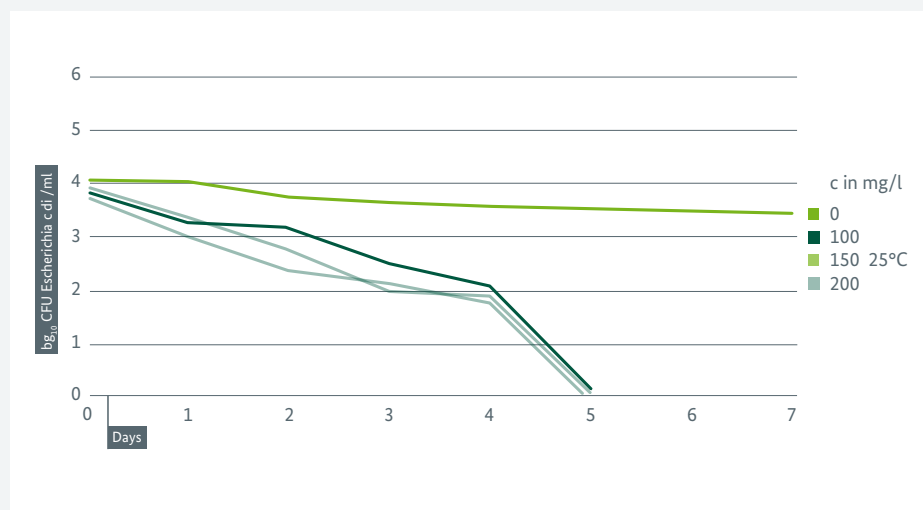


Knowing how to produce sausage products without nitrite curing salt is a learning process. Hermann Jakob, Director of the School for Master Butchers in Kulmbach, Germany, explains to students what is required.

The study concluded that whenever uncured meat products are introduced, retailers are recommended to offer free tasting sessions and information about the new product, thereby encouraging customers to buy it for the first time. As a profiling tool, the nitrite-free products helped to the entire range of organic sausage products in a positive light.

Food producers required to meet exacting standards

It goes without saying that the introduction on to the market of uncured meat and sausage products can only be justified if their consumption poses no health risk whatsoever. Only by employing adapted production technologies and drawing on relevant expertise is it possible to produce food which is either free of or contains reduced amounts of nitrite curing salt, and at the same time complies with exemplary hygiene standards. The German arm of the Research Institute of Organic Agriculture has therefore conducted a number of training measures for organic meat processors and published a guideline on the production of organic meat and organic sausage products either without curing agents or with only a limited amount of curing agents (*'Herstellung von Öko-Fleisch und Öko-Wurstwaren ohne oder mit reduziertem Einsatz von Pökelfstoffen'*). The guideline provides key technological data and plenty of practical advice for meat processors. It also serves as a point of reference when conducting food controls and inspections.



Impact of different concentrations of sodium nitrite on the growth of *Escherichia coli*



Hygienic safety of organic raw sausages

The production of raw sausages in particular comes with a natural hygiene risk, even if good production practices are adhered to. Even the raw materials for the production of sausage products are often infested with foodborne pathogens. Given the lack of scientific data, researchers from the Max Rubner-Institut in Kulmbach therefore analysed the efficiency of sodium nitrite in controlling pathogenic bacteria in raw sausages. In contrast to what has been assumed up until now, their analyses have shown that sodium nitrite requires very specific conditions to have an antimicrobial effect. For meat processing, this means that producers of organic raw sausage products, especially spreadable varieties, are required to adhere to good production practices and have a high degree of expertise. The adjustments made during the production process in order to comply with this requirement include selecting the appropriate starter cultures, ensuring the correct composition of sugars, setting an initial ageing temperature that is not too high and taking care to use raw materials that meet exemplary hygiene standards.



Further reading: these and other BÖLN studies

- Curing agents in organic meat products
www.orgprints.org/10466/
- Safe and adapted production of organic meat and sausages without, respectively with the reduced use of curing substances
www.orgprints.org/14275/
- Influence on the microbial effect of sodium nitrite in raw fermented sausage
www.orgprints.org/14568/

Fair, local and humane – a promising basis for successful marketing of organic produce

If the principles of organic farming are to be applied successfully and sustainable agriculture concepts are to be implemented on a permanent basis, then innovative and regional marketing is key. Ethical attributes such as 'fair', 'humane' and 'local' are not normally enough to sell products without some additional sales promotion and proper communication about the added value of organic food.



Appealing to consumers' emotions and winning their loyalty to a farm and its produce is particularly important in increasing their willingness to pay for organic food. Opinions vary about exactly how that should be done. In an effort to secure the future of farms, could one way of making organic farming attractive to consumers and farm successors be to introduce new collective ways of organising farms and marketing produce at a regional level, such as community-supported agriculture? This is a key issue facing organic farming.

Closely connected with innovative regional marketing are also questions about how to safeguard the flow of goods by using traceability systems, and how to improve the quality of process and product control, as well as questions about guaranteeing the provision of information about regional provenance and ensuring that the information is reliable.

That is why, ever since it first started, BÖLN has promoted innovative marketing projects with regional connections, which, by involving local farmers, generate worthwhile results that can be useful for producers, artisan food suppliers, regional initiatives and extension services.



Communicating the added value of organic produce regionally

In a time of increasing anonymity in the organic market, publicity that is tailored regionally is becoming more and more important. A BÖLN-backed study and the accompanying guidelines show how tried-and-tested types of campaign can convey the added value of organic products convincingly

Many organic farmers and producers of organic food operate on a regional level. They often go far beyond what is required for organic certification, but much of what some of these organic farms are doing is often barely visible to the outside world. It is therefore all the more important for the added value of organic produce to be presented comprehensibly and conveyed to consumers in an attractive fashion. In this regard, regional publicity is becoming increasingly important. The closer the food producers and processors are to the customer, the easier it is for them to reach those customers and persuade them of the quality of their products. In terms of regional publicity, there are various types of campaign available to organic farmers selling directly to the public and organic artisan



A farmyard festival appeals equally to adults and children.

businesses: an organic market or a traditional farmyard festival, tasting sessions, a gourmet dinner or breakfast, or even a storytelling café or organic cookery course. For families with children in particular – and depending on the season – other options may include an organic bike ride or organic Christmas or Easter baking workshops. But what do these kinds of promotion actually achieve? How can the added value of organic produce become embedded in customers' consciousness for the long term? How can people who until now have had nothing to do with organic farming also be reached? The Institute of Agricultural Economics and Farm Management at the Technical University of Munich teamed up with the consultants Markt und Region (mareg) to produce a study on this and draw up some guidelines with recommended courses of action. The aim was to enhance the capability of regional marketing

initiatives and artisan food suppliers and to convey the added value of their products in a professional way. To this end, the research team tested various campaign formats. The results showed that the best way to make customers enthusiastic about regional organic produce is through experiences and by appealing to their emotions. In all of the many conceivable campaign formats, the concepts of 'stories', 'performance', 'hands-on' and 'participants' proved to be essential for the success of a promotion: telling stories to gain customer loyalty instead of overwhelming them with information, organising experiences in carefully selected surroundings and settings to help consumers identify with the value-added chain, running hands-on activities and involving spokespersons who will attract new target groups.



Children learn about the added value of organic produce through hands-on activities.



Further reading: these and other BÖLN studies

- Elements for regional communication of surplus value of organic farming to consumers
www.orgprints.org/16757/
- Wie Bio-Aktionen zu Erlebnissen werden – Bausteine zur Kommunikation der Mehrwerte von Biolebensmitteln – ein Leitfaden (Transforming organic campaigns into experiences – components for communicating the additional benefits of organic food: a guideline) (German only)
www.markt-region.de/publikationen/
- Synergies or loss of profile? Potentials and problems of joint regional marketing of organic and non-organic products
www.orgprints.org/19286/
- Development of a communication strategy for products from sustainable aquaculture
www.orgprints.org/21706/ and www.orgprints.org/21881/
- Development of communication strategies for agro-biodiversity in gastronomy
www.orgprints.org/21026/
- Development and testing of vegetable pillars for city farming, as well as for education, public relations and marketing for the organic and sustainable food and farming sector
www.orgprints.org/21112/



Good marketing opportunities for organic kid meat

For dairy goat farmers, marketing the kid goats that are born as a by-product is often difficult, not least because the demand for kid meat is very limited in Germany due to people's eating habits. That is why agricultural marketing experts at the University of Kassel carried out a study under BÖLN to identify potential buyers of organically-produced kid meat and subsequently developed a marketing strategy.



Rearing dairy goats organically is becoming more popular in Germany. However, few goat farmers manage to sell the meat from their animals commercially as well as the milk, not least because they are the offspring of dairy goats and not of animals reared for their meat. For the larger dairy goat farms in particular, the additional cost of fattening animals that are not required for breeding on their own farms is barely affordable, due above all to the high cost of labour. Instead, many farms find themselves obliged to sell the kid goats that they cannot use for breeding dairy goats to conventional fattening farms in France, where there is a demand for kid meat. Against this background, agricultural marketing experts from the University of Kassel worked together closely with farmers to develop a marketing concept for kid meat.

Organic kid meat proving very popular

From the perspective of quality-focused food retailers and specialist butchers, there are many reasons for including a product that is somewhat unusual in Germany in their range. After all, kid meat is produced sustainably and in a humane manner and the customer group that attaches great value to these factors in particular is growing all the time. Furthermore, at tasting events, many customers were very positive about the flavour of kid meat: 95 percent gave the kid meat that they tried a positive rating for taste, and over half of them even rated it as 'very good'. Based on customers' feedback,

over 70 percent of those who tried kid meat would be very likely to buy it. That is why the experts at the University of Kassel highlight tasting events and the handing out of recipes as the most important marketing tool in helping to make this relatively unknown product more accepted among consumers.

Animal welfare the most important reason for buying

The researchers also identified some socio-demographic differences between potential buyers and non-buyers: the consumers who expressed an intention to buy were mainly female and living in two-person households. With an average age of 54, they were about ten years older and more health-conscious than non-buyers. Overall, the potential buyers of organic kid meat consumed slightly more meat than the non-buyers. For both customer groups, the animal welfare aspect was of primary importance, followed by the taste and the health benefits for potential buyers. As far as the group of non-buyers was concerned, the second most important reason for buying would be to support organic farming. The customers who expressed an intention to buy were more willing to pay more for organic produce and high-quality food. They were also more open to new products, as shown by the high level of agreement with the following two statements: “When I am food shopping I pay a lot of attention to quality, even if it is much more expensive” and “I like to cook unusual dishes and recipes.” They see organic kid meat as a healthy, low-fat food.



Deliciously cooked kid meat happily appeals to many customers.



Food retailers promise sales opportunities

The agricultural marketing experts from Kassel believe that all these factors point to potential for expansion in the market for organic kid meat. They see flavour-loving meat-eaters and experimental gourmets as attractive markets for kid meat. For dairy goat farmers who do not employ direct marketing, food retailers especially would offer attractive sales opportunities. This is a way of reaching particularly large numbers of customers, because the supermarket is one of the main sources of organic meat. However, retailers set high standards regarding the quality and quantity of the kid meat. This requires the producer to be very professional and have considerable expertise in fattening goats.

The researchers therefore recommend operating a collaborative production system, based on the Swiss model. In Switzerland, it is standard practice for dairy goat farmers to sell their kid goats to specialist fattening farms in their region when they are only five to ten days old. Continuing along the same lines, the researchers believe that it would also make sense for dairy goat farmers here to form producer collectives and organise shared fattening of their kids. With start-up funding they could support the setting up of adequate fattening facilities and in this way help to provide a good solution to the kid goat problem..



View from the farmer

Andreas Kern, Bioland specialist consultant for sheep and goat farming

“The BÖLN-backed marketing study is extremely helpful for organic dairy goat farmers. Only if we manage to improve the marketing of goat meat in future will it be possible to develop organic dairy goat farming in Germany sustainably. It is very pleasing to know that goat meat is well received by most consumers. It strengthens our belief that we are on the right track and that it really is worthwhile to explain the special benefits of goat meat to consumers and to work actively with food retailers, in addition to our direct marketing.”



Further reading: these and other BÖLN studies

- Development of a marketing concept for organic kid goat meat from dairy goat farms
www.orgprints.org/22310/
- Farmer Consumer Partnership
www.orgprints.org/15737/
- Concept for product differentiation within the beef market - Possibilities of communication and willingness to pay for beef from extensive, pasture-based suckler cow husbandry.
www.orgprints.org/21019/
- Price political margins for regional produced organic products: analysis and implementation of a regional marketing strategy for organic milk products
www.orgprints.org/13072/



What is the key to competing successfully?

As factors of production – most notably land – become ever scarcer and the problems of protecting the environment remain unresolved both in Germany and around the world, great importance is attached to improving the productivity and competitiveness of organic farming and other forms of sustainable agriculture, while at the same time safeguarding and enhancing the related ecosystem services.

Despite the successful completion of several BÖLN research projects in this field, there are still a number of obstacles along the value chains which need to be overcome. Opportunities for further development need to be better harnessed in order to make lasting and notable improvements to the competitiveness of organic farming and other forms of sustainable agriculture. Answers still need to be found to questions regarding biogas production or how to make domestic organic farming more competitive against imported organic products or other traditional forms of production. Rising inspection costs due to external production risks such as residues of pesticides and genetically modified organisms (GMO) are reflected in product prices. As such, they represent a further problem to efforts aimed at increasing the competitiveness of organic farming. As a result, BÖLN has long been supporting research projects which help to demonstrate and reduce the obstacles to development in organic farming and thus contribute to boosting its capacity to compete and expand in the long term.



What needs to be done to help organic farms survive?

A wave of conversion by organic farms back to conventional farming is a long way off. That said, those farms which do decide to leave the organic sector deserve particular attention. Organic farming in Germany could grow more rapidly if fewer farms left the sector. A study carried out under BÖLN reveals for the first time what policy-makers, farming associations and extension services can do to stop other farm owners from reverting to conventional farming or from giving up their farms altogether.

Since the end of the 1980s, organic farming has developed into an important sector of the economy. Yet when measured against the positive growth in sales of organic food, the total number of organic farms in Germany has increased only moderately in recent years. Looking at the current development in terms of the number of organic farms and the area of land under organic cultivation, the increases are far less than what the German sales market would lead one to believe. The growth figures for recent years highlight another factor: the impact created by new farms entering the organic sector is offset by the number of farms that leave the sector – either due to a decision to convert back to conventional farming or as a result of farms having been given up altogether. Achieving the desired expansion of organic farming ultimately hinges not only on being able to attract as many newcomers as possible, but also on minimising the number of farms leaving the sector.

A look behind the figures

Focusing on farms leaving the organic sector, researchers from the Thünen Institute and the University of Kassel therefore examined farm structure data over the period from 2003 to 2010 and surveyed more than 700 farm owners nationwide on their reasons for deciding to stop farming organically. Their analyses show that an average of 606 farms left the organic sector each year over the seven-year period under review, of which two thirds reverted to conventional farming. This corresponds to an average share of 3.3 per cent of organic farms each year. From a statistical perspective, for every ten new organic farms that joined the sector, there were four farms that reverted to conventional farming and two farms that were given up completely.

As expected, there was a close correlation between leaving the sector and the form of employment, size of farm and the age of the farm owner. For instance, among the farmers abandoning the sector, there were a particularly high number of part-time farmers, smallholder farmers and farm owners over the age of 65. Those farms which gave up agriculture altogether included fruit-growing and horticultural enterprises and, in particular, sheep and goat farms. There was also a disproportionately high number of sheep and goat farmers among those switching back to conventional farming, along with cattle fattening farms. In contrast to this, most farms engaged primarily in the growing of vegetables and potatoes remained loyal to organic farming and therefore maintained corresponding farming methods over the long term.





The incentive to farm organically falls if good money can be earned from energy crops and biogas.

No sole reason for reconversion

For the vast majority of farm owners, there was no primary reason for converting back to conventional farming, but instead a variety of personal, operational and external factors which led them to take this step. In addition to economic difficulties, the farms often found it hard to comply with organic standards and the requirements for organic certification. Furthermore, if rising prices mean that good money can be earned from conventional farming or, in particular, from energy crops and biogas, there is less of an incentive to farm organically. Moreover, with its guar-

anteed tariff for electricity from renewable energy sources, the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz (EEG)) means that space is becoming ever scarcer and farm rents are soaring. Given the already sharp increases in production costs and low premiums for organic farming, this makes it even more difficult for organic farms to remain economically viable. As a result, many farmers see no other alternative but to intensify production by reverting to conventional farming practices, often coupled with a move into energy crop cultivation or a decision to operate their own biogas facility.

More conventional farmers calling it a day

What is particular noteworthy from the researchers' point of view is that the annual rate at which organic farmers are giving up their farms (1.4 percent) is considerably lower than the corresponding figure among conventional farmers.

For the organic farmers concerned, the decision to give up their farms was due first and foremost to economic factors. In addition, several farms lacked a successor. Specific, organic-related reasons, in other words the difficulties associated with organic farming, played no more than a very minor role in the decision. However, the move to give up a farm often resulted in the loss of land for organic farming: 60 percent of the land originally under organic cultivation was subsequently used for conventional farming practices.

Need for different approaches

Due to the many different reasons for switching back to conventional farming, the researchers recommend adopting a wide-ranging set of measures. All the same, they assume that conversion back to conventional farming methods will continue in future, at

least to some degree. Switching the focus of their operations may also make perfect sense for the farmers concerned should their personal and operating requirements change and no longer be compatible with organic farming.

Nevertheless, researchers believe that improving the general conditions for organic farms as a whole and significantly strengthening the ability of organic farming to compete with conventional agriculture is a key challenge facing policy-makers.

According to the farm owners surveyed, establishing reliable frameworks is paramount if this challenge is to be met. A positive impact also stems from standardised and simplified organic inspections, as well as from better marketing conditions and higher prices. There is also a pressing need to restructure the Renewable Energy Sources Act, and not just in the interests of organic farming. For example, besides limiting the quantity of maize used in biogas plants, measures under consideration include reducing the guaranteed feed-in tariff and abolishing direct payments for growing maize intended for fermentation in biogas plants.



Many of the farmers surveyed complained about the time spent dealing with red tape involved in organic inspections.

However, besides policy responses, research is also required in order to address these issues. Taking into account the specific objectives as regards environmental protection and animal welfare, the gap in terms of output compared to conventional farming needs to be narrowed if organic farming is not to be left behind. The recommendation of researchers to make organic guidelines more transparent and structure them in a way that can be applied to actual practice, together with expanding the range of extension services available for newcomers especially, is directed at associations and agricultural administrators. This is because the expectations that farmers have when switching to organic practices are not always met: many only realise in retrospect that the yields of organically farmed produce and the opportunities to market this produce are limited. One possible solution to this problem is to introduce initial consultation as an obligatory measure which will take place and to do so whenever a farm registers for the first time for organic inspection. As a basic principle, associations and extension services should also make it clear which farms are actually suited to a switch to organic farming, giving equal consideration in the process to marketing and business-related aspects.





Voices from the organic sector

Annegret Grafen-Engert, senior editor of the journal bioland

“In the past, the organic sector was always only interested in those farms switching to organic farming. The high number of farms leaving the organic sector should make everybody who wishes to expand the sector sit up and think. The BÖLN-backed study provides us for the first time with meaningful figures. A really key finding of the study is far as I’m concerned is that only 22 percent of the farms leaving the organic sector sought advice when making the switch. It will therefore be vital in future to facilitate access to competent extension services for farmers interested in making the switch. What is more, policy-makers should put in place better training for prospective farmers and make organic farming a firmly established element of their training. It is quite obvious that farmers’ perceptions as regards the organic sector are often incorrect.”



Further reading: these and other BÖLN studies

- Extension of organic farming in Germany: Determination of reasons for reconversion of organic farms to conventional agriculture and development of a sustainable approach to prevent it www.orgprints.org/22697/
- Determinants of German land retail prices – an analysis aimed at enhancing competitiveness of organic farming and other forms of sustainable agriculture www.orgprints.org/21025/
- Impact of land tenure market conditions on the growth of organic and other sustainable farming www.orgprints.org/21656/
- Advisory work for organically working producers in Germany – its quality, perceived by clients, and its contribution to the farms’ competitiveness www.orgprints.org/22211/
- International competitiveness of organic cereal, oilseed and pulse production and strategies for the expansion of production in Germany www.orgprints.org/22580/

Good report for BÖLN

BÖLN was launched in 2001, when it was still operating under its former name BÖL. Back then, nobody anticipated just how rapidly organic farming in Germany would grow in subsequent years, recording double-digit growth rates in terms of sales recorded both by farmers and retailers. From a research perspective, the impact that BÖLN and its various activities have had on this growth cannot be clearly calculated. However, the excellent work performed by the employees of the Federal Scheme in their core task of strengthening organic farming in Germany has been firmly underlined by external experts and researchers.

The impact of the work carried out under BÖL was scientifically examined as part of a two-year evaluation process. To this end, 83 completed BÖL projects from the period between 2005 and 2010 were selected at random. The evaluation also included the results of online surveys conducted among project managers as well as data from an internal database which were analysed by external researchers, practitioners and assessors.

The conclusion reached by the assessors was that BÖL generally performed its duties either well or very well. The close relationship to practice of the research projects that were managed was highlighted by the assessors as one of the scheme's major strengths. For instance, the external assessors declared that 83 percent of the supported projects were of considerable benefit to practitioners involved in the production, processing and marketing of organic goods. According to the experts, this shows that the needs and problems of practitioners were granted utmost consideration in the selection of the research projects.

Successful transfer of knowledge

Another positive factor in the view of the assessors' was the broad distribution of information and findings from the completed projects via a whole array of different media. Specialist publications, workshops and conferences were just some of the ways in which many findings were passed on directly to target groups. In order to make the work even more sustainable, the assessors recommended firmly establishing the transmission of information as part of an overarching approach and placing a greater emphasis on setting up channels of communication geared towards the long term. They also advise developing a clearer strategic and programme-based focus for BÖLN.

The only element of the scheme that was criticised was the high proportion of research projects in the areas of crops and soil; on average, these accounted for around 46 percent of all trials and studies. In most cases (78 percent), however, the findings of these projects had proved instrumental in developing research and practice. For the most part, the supported research and knowledge transfer projects were extremely innovative in terms of their systemic approach.

Correct use of funds

The assessors also deemed BÖL to be extremely efficient in its use of research funds. The breakdown of funds between fundamental research, status quo analyses and knowledge transfer was considered to be appropriate as well. The assessors also found the project managers they questioned to be extremely satisfied with BÖLN employees.

Taking BÖLN forward!

For the employees of BÖLN, the positive assessment by external specialists is both an acknowledgement and an incentive to continue consistently aligning its research activities with the needs of practitioners. This applies just as much to the choice of research matters as it does to the design of projects, which are characterised by an interdisciplinary approach and the involvement of actual farms and other enterprises on the ground. At the same time, the experts' recommendations provide valuable assistance when it comes to enhancing the efficiency of BÖLN's work. In this regard, the aim is to continue providing successful support to organic farming and to other sustainable forms of production in Germany. In so doing, the close links with practitioners that are the hallmark of BÖLN will be the key element that will be constantly refined over the next few years.



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