

QLIF subproject 4:

Livestock production systems



Photo: ICROFS

Development of strategies to improve quality and safety and reduce cost of production in organic and low-input livestock production systems

Results obtained in the QLIF subproject 4 have provided recommendations to farmers and stakeholders on how to improve organic livestock farming. Progress was made in areas of housing, feeding and management. Often the recommendations are straightforward, and ready for implementation. In other areas challenges remain. In some cases, progress with respect to one objective has created new challenges. In these cases it is difficult to decide whether a change is an overall improvement or not.

This leaflet includes a focus on means to prevent and control parasitic infections in pigs and poultry, e.g., by inclusion of dried chicory roots in the diet of sows and boars to reduce the level of roundworm infections. Further, it is stressed that control of *Ascaris suum* and *Ascaridia galli*, the main helminth parasite species in pigs and poultry, needs to be achieved through a package of measures rather than single measures, such as protocols for cleaning of the dunging area. Udder health, milk quality and animal welfare in organic dairy farms are other subjects where progress is described.

Focus on housing and management techniques is essential for quality, health and welfare in organic livestock production systems

Challenges in organic livestock

Organic production systems aim to provide various benefits to society. These benefits are associated with the four IFOAM principles of organic agriculture: Health, Ecology, Fairness and Care (www.ifoam.org). Implementation of the principles into organic livestock systems involves careful study on how housing and management factors affect the health and welfare of animals, the environment we live in, and the farmer's income. This is a challenging task, as the underlying housing and management techniques used to make the principles operational do not always complement each other. The QLIF subproject 4 aimed to address six of the most relevant gaps in our knowledge when taking up this challenge.

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Preventing parasites in hens and pigs

The risk of parasitic infections is increased in hens in free-range systems compared to systems without outdoor access. Results of the present project have shown that improvements in run management and reducing the stocking density can significantly reduce faecal egg counts of the two helminth species of poultry (*Ascaridia galli* and *Heterakis gallinarum*) in outdoor runs.

In a second experiment two litter management regimes (replace or add litter material) were compared to unmanaged litter. The regimes had no significant effect on water content of the litter or on parasitological parameters. These results suggest that positive effects of run and litter management regimes on helminth infections of laying hens are often overestimated in practice.

On organic pig farms *Ascaris suum* is the most prevalent helminth and is transmitted mainly via the faeces. A first study therefore focused on assessing the efficacy of different protocols for cleaning the dunging area of pigs. The results suggest that improved cleaning protocols alone are not sufficient, but should be part of a package of measures against the parasite.

A second study quantified the effect of dietary inclusion of dried chicory roots on roundworm (*Oesophagostomum* spp) infections in naturally infected sows and boars, since pilot studies had shown that dietary inclusion of dried chicory roots may reduce infection and egg excretion levels in pigs. Dried chicory abolished egg excretion within 2-6 days and can therefore be recommended.

Control of parasites in poultry and pigs

Control of the poultry red mite *Dermanyssus gallinae* is a challenge for organic as well as conventional egg producers. A range of alternative treatments were tested *in vitro*. In on-farm experiments, diatomaceous earth was effective during a limited period only, whereas two liquid formulations of silicas had a good residual effect against the red mite.

To reduce the use of synthetic drugs to combat *Ascaris suum* in organic pigs, herbal preparations were tested for the prevention and control of a mild infection of *Ascaris suum* in growing and finishing pigs. Yet, none of the tested alternatives provided a sufficiently reliable reduction in worm burden.



Photo: ICRF/S



Increased non-immune defence in pigs

To control gastrointestinal pathogens causing diarrhoea in pigs we tested the potential of probiotic *Bifidobacterium* strains as well as prebiotic and acidified nitrite supplements. It was demonstrated that microencapsulated probiotic strains were able to pass through the acid barrier of the stomach and establish increased population density in the intestine. However, although the ability of probiotic strains to inhibit enteric pathogens was demonstrated *in vitro*, this could not so far be confirmed in experiments *in vivo*. This was also true for antimicrobial activity of acidified nitrite treatments. Further, supplementing finishing pigs with maize silage, grass silage or a probiotic preparation did not significantly affect growth and carcass traits.



Eating quality of pork

Due to the restricted availability of limiting amino acids in organic livestock production, protein accretion capacity is limited compared to conventional production. This may restrain the intramuscular fat (IMF) content which influences the sensory quality of pork. In on-farm trials the effect of the implementation of a specific feeding strategy using a high proportion of home-grown grain legumes on the IMF content of pork was assessed under different conditions on German and Austrian organic farms. Results confirmed the great variation between the farms for IMF. It was thus concluded that there is a need for a direct assessment of IMF content of pork at the abattoir to fulfil the expectations of consumers with regard to a high eating quality of organic pork.

Prevention of mastitis

In QLIF subproject 4, a study was initiated to identify the main factors influencing udder health in organic dairy farms under different climatic and structural conditions. Results show that improvement of housing and environmental conditions and farmers' skills allow partial conversion to a treatment scheme based on teat sealant dry-off prophylaxis, which reduces the need to use antibiotics.

It was also found that calves reared with their mother grew faster, while no negative effect of suckling on the somatic cell count or negative impacts on animal health status were observed. However, the extra live weight gained by suckled calves up to 1 year of age could not be sustained into first lactation. There was high variation in milk production of raised heifers, resulting in no significant difference between treatments in terms of milk production.

Improved milk quality by feeding

Previous observations at IGER showed that feeding clover silages (CS) to cows increases the polyunsaturated fatty acid content of milk. However, it was not previously tested how the CS-based diets influenced the faecal shedding of enteric pathogens. The present studies gave no clear indications that feeding red clover silage (RCS) affects faecal shedding of *L. monocytogenes* or *E. coli*. However, it was demonstrated that milk and milk protein yields can be significantly improved by feeding RCS as 1:1 mix with maize silage, but that the efficiency of utilisation of forage N was reduced when diets contained more than 10 percent RCS.

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Selected publications

Biavati B, Santini C and Leifert C (2007). Alternative strategies to reduce enteric bacterial infections and improve microbiological safety of pig and poultry production systems. In: *Handbook of Organic Food Quality and Safety* (J. Cooper, U. Niggli & C. Leifert, eds.), pp 241-265. Woodhouse Publishing Ltd., Cambridge, UK

Spoolder HAM, Mejer HE, Vermeer HM, Meerburg BG, Krimpen M van and Kijlstra, HA (2007). Prevention and treatment of parasitic infections in organic pigs. In: *Proceedings 3rd QLIF congress, Hohenheim, Germany, March 20-23, 2007*, pp 327-332

Wagenaar JP and Langhout J (2007). Practical implications of increasing 'natural living' through suckling systems in organic dairy calf rearing. *Netherlands Journal of Agricultural Science* 200, 35-42

About QLIF

The Integrated Project QualityLowInputFood aims to improve quality, ensure safety and reduce costs along the organic and low-input food supply chains through research, dissemination and training activities. The project focuses on increasing value to both consumers and producers using a fork-to-farm approach. The project is funded by the European Union and runs from March 2004 to March 2009. The research involves thirty-one research institutions, companies and universities throughout Europe and beyond.

QLIF comprises seven subprojects on:

- 1) Consumer expectations and attitudes
- 2) Effects of production methods
- 3) Crop production systems
- 4) Livestock production systems
- 5) Processing strategies
- 6) Transport, trading and retailing
- 7) Horizontal activities

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Information on partners and subprojects is found at the project website www.qlif.org. The website also holds the library for project newsletters and serves as entry to Organic Eprints, where more than 100 publications from the QLIF project are available: http://orgprints.org/view/projects/eu_qlif.html

