

9

Animal production and feeding



Organic livestock farmers will try to accommodate the natural needs and behaviour of their animals as much as possible. They pay extra attention to animal health and welfare, but also set high standards for housing, outside access and feed. Dutch researchers are looking for practical solutions to the problems that currently limit the sustainability and growth of organic animal production.

Research carried out in the various sectors of organic animal production is directed not only toward improving animal health and welfare, but also at achieving 100 per cent organic livestock farming. This encompasses all aspects of production, including rearing, feeding and manure use. One of the main objectives is to create husbandry systems that provide the animals with a relatively high degree of freedom and in most cases outside access. Straw or other forms of litter are also indispensable as they offer housed animals a semi-natural area to stand or lie down in.

Organic livestock farming in the Netherlands is quite specialised. Especially pig and chicken farms use feed produced elsewhere, making it difficult to close mineral cycles on the farms. For this reason, development of the organic sector will depend to a large extent on the regional exchange of feed, straw and manure between arable farms and specialised livestock farms.

“Growth is important for organic livestock farming. The sector is currently too small and thus especially vulnerable to market swings. We hope that our research will inspire experienced as well as new entrepreneurs to make the switch”, explains Maarten Vrolijk, leader of a demand-driven research programme on organic animal husbandry involving Wageningen UR and the Louis Bolk Institute. Knowledge circulation has received special emphasis in this research programme. “This applies not only to existing formal knowledge among established experts or researchers, but also to knowledge gained through experience in the field. Participation of livestock farmers in research projects is very important to us”, says Vrolijk. In every sector – dairy cattle, pigs and poultry – collaboration is sought with thematic study groups consisting of advisors and organic livestock farmers. These groups facilitate the exchange and application of knowledge, and are supported where necessary with problem-directed research.

Experimental farms

Every agricultural sector in the Netherlands has access to its own experimental organic farm: Aver Heino for dairy cattle, Raalte for pigs and Spelderholt-Lelystad for poultry. These centres carry out experimental research, often in collaboration with research being conducted at commercial farms. The experimental farms also function as knowledge centres for the corresponding sector by offering demonstrations, theme days, excursions, open days and courses.



Ina Pinxterhuis

“Clover is the green motor of organic dairy”

Ina Pinxterhuis



Dairy cattle

The positive image enjoyed by the organic dairy sector has resulted in a growing demand for organic dairy products, but also in high expectations. Consumers naturally assume, for example, that organic cattle farms are more environment-friendly than conventional farms. To live up to its image, the organic dairy sector is striving, among other things, to achieve 100 per cent organic feed (see box) and closed nutrient cycles. The fixation of nitrogen is an essential factor, and clover is expected to play a key role in this regard. "Clover is sometimes called the 'green motor' of organic dairy farming", says Ina Pinxterhuis, dairy farming expert of the Animal Sciences Group at Wageningen UR.

Conventional dairy farmers intending to switch to organic production have to first increase the proportion of clover in their pastures. Pinxterhuis: "In permanent grassland, clover needs a few years to become well established. If sufficient time is not allowed, discontinuing the use of synthetic

fertilizers could lead to a significant decrease in production. On an annual basis, a 40 to 50 per cent proportion of clover in the grass is optimal for both dairy and grassland production. The proportion of clover can decrease quickly due to weather conditions in the winter period or serious drought in the spring or autumn, but it normally increases during the growing season. Pinxterhuis: "There are no general guidelines on how to achieve a certain proportion of clover in a pasture, but we have been able to compile a number of basic rules for cutting and harvesting. The proportion of clover decreases, for example, if the sward is cut too short or with heavy cuts. By adding clover to the production system, the farmer becomes more dependent on nature, but this is a basic aspect of organic farming."

The ultimate objective of current research is to ensure that Dutch organic dairy farms use organic rations made up of locally or regionally produced raw materials, and that they supply manure for the production of these raw materials. This closed cycle will require, among other things, insight into the efficient use of manure in both crop rotations and grass-clover production (see Chapter 5). Another important factor, and subject of continuing research, is the farmers' own production and efficient use of fodder. The organic sector is currently leading the development of regional and land-based farming systems, and it wants to retain this lead. Pinxterhuis: "Importing raw materials for livestock feed is not consistent with society's image of organic farming." For this reason, a regional project was set up to look for optimal linkages between crop production, animal husbandry, and nature and landscape management. The idea is that new forms of regional cooperation will lead to more efficient land use, more closed nutrient cycles, greater biodiversity and local, high-quality products" (see box on Overijssel in Chapter 4).

Pigs

"Our research is chain driven; the industry sets the agenda. The emphasis on animal nutrition is therefore not surprising. Feed still makes up the largest part of the cost price, especially in organic pig farming", says Herman Vermeer, researcher in pig farming at the Animal Sciences Group. "About 10 per cent of the pig feed currently used in organic production is made up of conventional raw materials. This percentage is slowly decreasing in response to stricter European regulations. By 2012 the organic pig sector will be required to use 100 per cent organic feed. At the moment organic raw materials for feed are still scarce and therefore expensive. Switching to locally grown organic raw materials will also have important consequences for the ration composition", explains Vermeer. The protein content of organically grown feedstuffs is generally lower than that of conventionally grown feedstuffs. Digestibility research is therefore being carried out to help the feed industry optimise the composition of organic feeds (see box 'Digestibility of organic raw materials'). Researchers are also looking at ways to influence the feed intake of finishing pigs. "At the moment we are looking at feeding grass silage to sows. In practice this is often given as a supplement. The sows are large and robust, and the initial results are positive", says Vermeer.

100 per cent organic feed for dairy cattle

Since early 2008, all feed given to organic ruminants has to be from 100 per cent organic sources. The experimental farm Aver Heino has for a number of years been investigating ways to optimise feeding strategies and rations for dairy cattle. This research is focused especially on maintaining high protein efficiency and sufficient mineral supply for animals given 100 per cent organic feed. One option being considered is using domestic grain in place of concentrates. Grain has a high starch concentration and low protein content, but grass-clover silage can supply the protein needed to break down the starch in the cow's rumen. Research has shown that it is possible to feed a lactating cow six kilograms of wheat per day. Despite the low protein levels in the rations, the cows produce a sufficient amount of milk. No negative effects on the animals' health have been found. Other research is investigating whether adding corn starch can improve the utilisation of a ration containing grass clover. Red clover is often used in organic livestock farming as a feed crop. The Animal Science Group and Belgium's Institute for Agricultural and Fisheries Research (ILVO) are currently looking for a way to accurately estimate the nutritional value of grass-clover (red or white) mixtures.

'Organic goat' project

The 'organic goat' project coordinated by the Louis Bolk Institute is a dynamic knowledge development project that has no fixed partners. Any organic goat farmer may participate in the research. About 70 of the 600 goat farms in the Netherlands are organic, and they are all welcome to suggest new ideas for research through their sector representatives. The research carried out within the organic goat project relates to both nutrition and health. For example, researchers are looking at ways to discontinue the use of synthetic vitamins, optimise rations, manage cost price, and enhance distinguishing product quality and animal welfare characteristics. A study on the fatty acid composition of goat milk was also recently completed. Compared to cow milk, goat milk has a higher content of two medium chain fatty acids (capric acid and caprylic acid) and about the same amount of polyunsaturated fatty acids (CLA and omega-3). Feeding the goats fresh grass and adding oil to their rations increases the levels of these desirable fatty acids in their milk. Sunflower oil is especially good at stimulating the CLA content and linseed oil at increasing omega-3 levels. Higher levels of unsaturated fatty acids are not only beneficial to human health, but they can also help produce creamier goat cheese that is sliceable after just a short ripening period.



Herman Vermeer

The organic pig sector has also instigated research on organic breeding techniques. At the moment, sow stocks are replenished with conventionally reared sows, in addition to the sows reared by the organic farmers themselves. It would be costly and difficult to set up a separate breeding farm for organic pigs, because of the industry's limited scale and the specific characteristics of organic animal husbandry in the Netherlands. However, to meet European regulations and become free of conventional inputs, the sector will have to supply its own sows in the future. A preliminary feasibility study revealed that this would lead to a significant cost increase of 7 Euros per pig and 12 euro cents per kilogram of slaughter weight. The technical aspects of breeding organic sows are also being investigated, including race options and breeding structure. The objective is to develop a more robust and resilient pig that is better suited to organic conditions. Together with the breeding organisation TOPIGS/IPG, research is being conducted to find a more suitable sire for organic pork production.

Housing is also being looked at in close cooperation with the industry. Vermeer: "Organic pig farmers planning to build new housing units often come to us for advice." Many find inspiration in the animal-friendly housing concept ComfortClass developed at the Raalte experimental farm. Research findings have already led to practical applications, says Vermeer, including the discovery that social structures in groups of pigs are important. Groups should therefore be kept together as long as possible, from rearing all the way through to finishing. "This can actually be achieved quite simply, for example by building stalls in new housing units that correspond to the pigs' sizes in each consecutive stage."

Digestibility of organic raw materials in pig feed

Until now, the feed industry has assumed that organic raw materials have about the same composition and digestion coefficients as conventional, non-organically grown raw materials.

Research initiated by organic pig keepers in cooperation with the feed industry has shown that protein-rich organic raw materials, such as rapeseed and soy flakes, have a lower content of crude protein, crude cellulose and crude ash than the same non-organically cultivated crops. Their fat content and energy value are also higher than the figures given in conventional tables.

This was demonstrated by experiments on finishing pigs that looked at the intestinal and faecal digestibility and nutritional

value of organically produced raw materials (such as flakes of rapeseed, soy, sunflower, sesame seed and blue lupine). The study determined the digestibility of the dry matter, organic matter, ash, crude protein, crude fat, non-starch polysaccharides (NSP), amino acids and starch.

Research into the digestibility of nine commonly used organic, high-energy and crude cellulose-rich raw materials, such as grains and wheat semolina, is still underway. At the Raalte experimental farm, research into the digestibility and nutritional value of organic forage for finishing pigs, such as grass silage and forage maize, is ongoing.

"The organic pig sector sets the agenda for our research"

Herman Vermeer

Group size of finishing pigs

It makes no difference, in terms of technical results or slaughter quality, whether organic finishing pigs are kept in groups of 15 or groups of 30. This was the conclusion of research carried out at the Raalte experimental farm. "Curious", says researcher Herman Vermeer, "because at conventional farms there is a significant difference between these two groups. There the animals perform better in small groups." The research was initiated because many organic pig farmers in the Netherlands have been forced to keep their pigs in relatively large groups (of 30 or more). Farmers' options in constructing outside runs have been limited by the layout of existing stalls. "These building limitations are not a problem when new housing units are constructed; the farmers can then choose to keep smaller groups. Our research demonstrates, however, that this is not necessary to achieve better results", says Vermeer. The health of the animals in the differently sized groups was also basically the same. There could still be other arguments for choosing smaller groups. For example, keeping smaller groups makes it easier to sort the pigs by weight and sex.

Poultry

Housing and feed are also important themes for research on organic poultry farming. Since there are very few organic broiler farms in the Netherlands, most of this research is focused on laying hens. The number of organic laying hen farms is growing steadily. "There are currently almost one million organic laying hens in the Netherlands, divided over 160 farms. We think it's important that these companies do well, and we therefore support them with research", reports Monique Bestman, poultry researcher at the Louis Bolk Institute.

"The outdoor run receives special attention, as it is the showpiece of organic farming. Consumers and farmers find it important, but its primary purpose of course is to improve the welfare of the chickens. The objective is to allow the chickens to behave naturally – to scratch and dust-bathe", explains Bestman.

Research conducted by the Louis Bolk Institute and the Animal Sciences Group of Wageningen UR revealed that the design of the run is very important. "Chickens have the tendency to seek cover, which makes them feel safer. Good landscaping, that includes trees for example, helps to entice the chickens out of the coop", says Bestman.

Outside access also has important environmental consequences. Research has shown that the amount of manure accumulated in outdoor runs can be too high. Bestman: "It is especially important that the area directly around the coop be designed in such a way that the manure can be



removed." The Animal Sciences Group has also conducted several long-term projects on keeping dioxin levels in outdoor eggs within EU standards for safe food products. Although 95% of the farms in the Netherlands no longer have a problem with dioxin levels, a limited group of small poultry farms is still at risk. This is probably because these laying hens use the run more intensively and thus ingest more soil, worms and insects. Simple measures, such as restricting the amount of time the chickens are allowed outside, are enough to ensure that dioxin levels on these farms also stay within the established norm. This knowledge is valuable for organic egg producers throughout Europe.

The researchers also measured the amount of dust chickens are exposed to when kept temporarily indoors, for example during risk periods for avian influenza. The average dust concentration in the stables was 4.5 mg/m³, which was well above the norm of 3.4 mg/m³. Feather pecking is also a major problem among chickens that are only kept indoors, concludes Bestman. "The research confirmed what we already knew: an outdoor run is very important for chickens."

Literature

Mheen, H. van der and H.M. Vermeer. 2005. Outdoor pig farming in the Netherlands. In: Sundrum, A. and Weissmann, F.. 2005. Organic pig production in free range systems. Bundesforschungsanstalt für Landwirtschaft, Landbauforschung Völkenrode Sonderheft S. 281: 41-43.

Pinxterhuis, J.B. and A. Klop. 2007. Utilization of autumn grass/clover: pellets or silage? Grassland Science in Europe 11: 442-444.

Pinxterhuis, J.B.. 2006. Applied research for organic dairy farming. In: Changing European farming systems for a better future. Animal Sciences Group, Wageningen UR.

Vermeer, H.M. and H. Altena. 2008. Farrowing accommodation for organic pigs. Presentation Animal Sciences Group, Wageningen UR.

Wagenaar, J.P. and M. Bestman. 2006. Towards animal oriented rearing methods in organic production systems. Proceedings of the International Training and Exchange Workshop, QLIF project, Driebergen.

Information

Maarten Vrolijk MSc.

e-mail: maarten.vrolijk@wur.nl

Researcher System Innovations and Animal Husbandry

**Animal Sciences Group
Wageningen UR**

Ina Pinxterhuis MSc.

e-mail: ina.pinxterhuis@wur.nl

**Researcher Dairy Farming
Animal Sciences Group**

Wageningen UR

Herman Vermeer MSc.

e-mail: herman.vermeer@wur.nl

**Researcher Pig Farming
Animal Sciences Group**

Wageningen UR

Monique Bestman MSc.

e-mail: m.bestman@louisboltk.nl

**Researcher Animal Welfare & Health
Louis Boltk Institute**