

An organic perspective on reproduction and breeding methods

Wytze Nauta (Eco AB) and Anet Spengler-Neff (Eco AB)

Organic production is often and preferably low input production in the sense of using local and renewable resources. Production methods have to be based on natural processes, have to be animal friendly and durable including species-specific feeding and husbandry. What is the meaning of this concerning animal breeding and reproduction? Many researchers and farmers have discussed this already (Baars and Nauta, 2001; Haas and Bapst, 2004; Nauta, 2009; Pryce et al., 2001; Spengler Neff, 2011). In a world where breeding and reproduction methods have become very high tech and unnatural, the organic sector has to find its way. This paper gives an impression of what is needed for organic-low-input breeding.

Main differences between conventional and organic breeding

Conventional production and conventional breeders focus on uniform and stable systems with similar housing, feeding and treatments independent from the location. In this way animals can be developed for those systems on a large scale and genetic progress towards high production levels can be maximized. Sufficient feed for such animals is purchased from all over the world and the animals receive all the needed treatments (antibiotics, feed supplements) and often mutilation, like dehorning, debeaking, de-tailing, etc. to prevent them from harming each other and keep more animals per square meter. Housing systems are fitted to maximize production levels per animal and per person working at the farm.

Organic farming, however, is depending on local resources and those are diverse in their nature. To produce from local resources means that every area needs own adapted husbandry-systems and adapted animals. Even at small distances environments may differ. Therefore, the European outlines for organic animal production recommend the use of local breeds. Local, native breeds were selected and bred and adapted to their specific environments as well as for social, cultural and economic situations (Spengler Neff, 2011; see also Wagner, 2006).

Organic farming also respects animals' species-specific features giving them the opportunity to constantly use their specialized organs in a proper way to promote animal welfare and health (Lund, 2006). In organic farming the use of antibiotics (AB) is limited. This is a very important issue today. Policy makers in the Netherlands have set the task to reduce the use of AB in livestock production by 50% in the next 3 years to limit the risk of spreading resistant bacteria (Anon., 2011). In organic farming the preventive use of AB is prohibited and it should be used only for serious infections and to protect animals from suffering.

Selection traits for organic and low input systems – for example: dairy cattle:

All these facts ask for animals that can adapt to specific local environments. Many examples show that animals from conventional breeding programmes do not fit well into low input systems (Hardarsen, 2001; Rauw et al., 1998; Essl, 1982). The rapid genetic progress of production traits during the last two - three decades makes it even more difficult to feed those animals adequately on organic farms. Functional traits and health traits are getting more weight in all breeding programmes, however, environments between organic and conventional production systems also differ and GxE effects make it difficult to select the best animals for organic farming (Nauta et al., 2005; Simianer, 2009). In general low input systems ask for cattle that can convert roughage into milk and meat. Such cattle are not too open built, and have a good body condition score (BCS) (Thomet, 2007). Dairy cows which don't show great changes in body condition during lactation and never get very low in body condition are healthier, especially in roughage-based feeding systems (Spengler Neff, 2011).

Those are flexible, self sustaining animals capable to adapt their production to available feed. They are often dual purpose and don't use much body fat to produce milk, which is a risk for their health, but use energy from their muscles instead. Other interesting traits for low input systems are roughage intake or roughage converting ability are not measured at all, up to now.

The problem of breeding technologies

Conventional breeding programs are dealing with a strong competition on the market. Therefore reproduction technologies like AI, super-ovulation, ovum pick up, IVF, ET, oestrus synchronisation and recently sperm separation are used heavily to increase selection intensity and shorten generation intervals. However, these technologies are unnatural, and carry numerous ethical concerns with them (Rutgers et al., 1996; Schroten, 1992). Most of them are not in agreement with the intentions and rules of organic production (IFOAM, 2002; EU, 1999). Even AI actually shouldn't be used, but because of the wide spread use and the belief that the sector can not breed animals without AI, it is allowed in an additional specification of the organic rules (EU, 1999). Recently genomic selection has been developed, which can increase genetic progress even more. Next to direct impacts on animal welfare and integrity, because of one-sided, high production breeding goals all these developments create the risk of increasing inbreeding levels on a population scale (Weigel et al., 2001).

Does the organic sector have alternatives?

Organic products should be produced in a closed production chain, certified from 'seed to meat'. Concerning the reproduction methods, the organic sector needs to become independent of the supply of conventional breeding stock. Achieving this goal mainly depends on the farmers. More and more organic cattle farmers start using (partly) natural service for breeding (Nauta, 2009). Also pig producers use often boars for natural breeding next to AI. Goat and sheep breeding is still based on natural mating since synchronizing is not allowed and insemination of a few animals at a time is too expensive. Very few small scale poultry producers breed their own new stock. Those farm based breeders breed for traits like good health, feeding competence in a varying environment, roughage intake, stress resistance, etc. (Baars et al., 2005). Specific breeding programs are described for such small populations (Baars et al., 2005; Nauta, 2010). A supply and market of breeding bulls is still lacking for these farmers.

Most organic animal producers are, however, still using breeding stock from conventional programs. They are used to the supply of breeding stock and became over the years estranged from breeding with their own stock at the farm. They can be supported with some tools. A first option is a special selection and publication of ET-free breeding bulls with very good breeding values in functional traits from the conventional supply (Spengler Neff, 2011; Nauta and Langhout, 2004). Secondly, a special selection of bulls that are suitable for organic production can be made (Postler, 1998; Rozzi et al., 2007), and/or best young bulls from organic farms can be used in a young bull system (Nauta, 2009; Bichard, 2002).

In Dutch organic pig production the first steps are made to select suitable sows on organic farms for the production of new gilts in a three-way cross system (Ten Napel et al., 2009). For poultry research is still ongoing to find the perfect breeds and hybrids for organic farms (LIB, 2010). The first steps are taken to breed new and unconventional breeds and hybrids at organic farms (Baumann, 2010; Nauta, 2011; Zeltner, 2008). Some aspects should still be considered. For example: outdoor runs for breeding animals (like AI-bulls, boars, poultry pure lines); natural living for breeding animals. Until today, such aspects are not discussed and there are no rules for it either.

Conclusions

Today's conventional breeding goals and methods often don't fit to the guidelines and intentions of organic farming and production processes, because of animal welfare and integrity reasons and because of genetic aspects. There is a lack of an organic supply and a growing group of especially dairy farmers, converts to natural breeding.

To develop a closed organic production chain, including breeding and selection methods, the organic sector has to work out new methods for breeding, selection and specific selection traits, preferably within the sector itself.

Opportunities are there, for different species. However, new intensions, knowledge and encouragements of farmers and even rules should help to enforce the developments towards a truly organic animal breeding.

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