

Benefits and challenges of the on-farm implementation of measures aimed at integrating aspects of sustainability into pig fattening

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Abstract: In the course of a PhD-project measures were developed, implemented and evaluated, which aim at integrating aspects of sustainability into pig fattening. The selected measures comprise an increase of space allowance for the animals, provision of straw as enrichment material, omission of tail docking, use of GMO-free feedstuffs and improvement of animal health monitoring by reporting slaughterhouse findings to the farmers. Subsequently, these measures were implemented on three (currently operating) pig fattening farms in Austria. The impact of the combination of measures is evaluated regarding animal welfare, economic and environmental aspects as well as taking into account quality of work and life of the farmers using already established scientific methods. This paper specifically addresses the benefits and challenges of implementing the measures on commercial pig fattening farms and how these challenges and problems have been faced in the course of the project.

Benefits of on farm research comprise the possibility to include the farmers' (practical) knowledge and to take into account problems and limitations farmers encounter during their actual work (e.g. limited time for additional work or being dependent on other partners in the production chain like breeders or abattoirs). This aspect holds especially true for projects with an applied focus and helps to improve the applicability of results.

One of the main challenges lies in creating a 'flexible' study design, which can be adapted to varying on-farm conditions on the one hand (e.g. one farm's breeder did not want to omit tail docking) and is still strong enough to produce sound scientific results on the other hand. In this project, the study design was therefore adapted for each individual farm to meet all these requirements. Moreover, it is important to be able to react to and take into account unforeseeable changes or problems on the farms e.g. by preparing a decision tree for what to do in the case of a tail biting outbreak. Additionally, the farmers' motivation and interest in the project as well as interpersonal relations play an important role and can sometimes be a huge challenge for the success of such a project. Hence, trust-building measures like the joint formulation of contracts and confidentiality agreements were taken.

Keywords: on-farm research, pig fattening, sustainability, sustainable livestock farming, applied research, pig production systems, animal welfare

Introduction

Answering research questions in livestock sciences often requires empirical data gained through experiments. To guarantee scientifically sound results these experiments are usually conducted under a controlled environment as it is the case on research stations. However, the results obtained under these conditions are often not applicable to commercial farms as the conditions there differ considerably from those on experimental units. As a consequence, especially studies dealing with complex issues in livestock farming often yield better results in terms of applicability on and transferability to commercial farms (Sørensen & Hindhede, 1997 ; Statham et al., 2011).

Conducting research on commercial farms holds many chances and benefits, but is also facing challenges and problems. The aim of this paper is to discuss these benefits and challenges using the example of a research project concerned with the integration of aspects of sustainability into pig fattening and provide some recommendations for future studies.

Project description

The project, which serves as the basis for analyzing the challenges and benefits of on-farm research in livestock sciences, is conducted within the Doctoral School of Sustainable Development (dokNE) at the University of Natural Resources and Life Sciences, Vienna in cooperation with Billa, an Austrian retailer. It was developed in the light of the ongoing public debate on negative effects of intensive pig production systems on animal welfare and the environment.

In the course of the project, measures, which aim at integrating aspects of sustainability into conventional pig fattening, were developed and implemented on Austrian pig fattening farms. These measures comprise primarily animal welfare related measures such as higher space allowance for the pigs, provision of straw as enrichment material, omission of tail docking and improvement of animal health monitoring by reporting slaughterhouse findings to the farmers. The use of GMO-free and/or regional feedstuffs, which is also part of the measures concerning sustainability, has a more environmental connotation. Subsequent to implementation, the effects of the measures are being evaluated regarding animal welfare, economic, environmental and social aspects like e.g. working quality.

Public interest in a more animal friendly meat production is increasing; however, the practicability of these systems in the field has to be evaluated as well (Cagienard et al., 2005). Hence, the main focus of this project is to bring in the producer's perspective and to investigate the implications for the farmers resulting from the implementation of these measures – an approach which makes an on-farm implementation and evaluation an indispensable tool. This is in line with a definition of on-farm experiments given by Sørensen and Hindhede, who state that 'an on-farm experiment can be defined as an experiment conducted under circumstances representing the target group' (Sørensen & Hindhede, 1997:268).

The present paper discusses expected benefits and challenges of the on-farm implementation of the list of measures and draws some conclusions and recommendations for other on-farm research projects.

Expected benefits of the on-farm implementation

As already mentioned, the focus of interest in this study lays on the on-farm implementation of the measures and how the farmers perceive it. Hence, carrying out the implementation on commercial farms instead of research stations enhances the external validity of the study's results for other operating farms. This aspect is also put forward by Statham et al. (2011), who conducted a study on the effect of the provision of straw on the occurrence of tail-biting in pigs. The authors argue that due to the often very small sample size and the controlled environment of research

stations, data collected under experimental conditions may not be very useful for application on commercial farms.

As mentioned above, one aim of the project is also the evaluation regarding socio-economic aspects like the effects on gross margins and working quality. Experimental units are usually no family farms and probably not exposed to the same economic and also social conditions as commercial farms. Therefore, information on working conditions and economic outcomes of the implementation will be much more relevant for the focus of the study and, above that, will be more interesting and comprehensible for other farmers interested in the results.

Moreover, problems on the farm, which are related to the implementation of the measures, can be taken into account and solutions can be worked out already in the course of the study. This yields benefits in two ways: first of all, prior to and during the implementation period the farmers' practical experience is an important contribution to improving the implementation. Usually, scientists are ascribed a very deep and specialized knowledge whereas farmers have to deal with many different areas and aspects of the complex system of a farm (Leeb, 2011) and can therefore better estimate how this could affect other areas of farming. Secondly, farmers' experience can also be very helpful in finding solutions to problems that occur during the implementation. The farmers can provide knowledge about management practices and insights to help avoiding or solving problems, which would not occur on experimental farms and scientists are probably not aware of (Oliver et al., 2012). Hence, they can already be discussed in the course of the study and included into results and outcome, whereas otherwise they would only occur when experimental results are put into practice and farmers then would have to cope with these problems themselves.

Finally, present problems and issues, which are relevant for pig farmers can be taken into account and are discussed with the farmers on site, which helps to better integrate their point of view into the study and consequently enhances the study's significance for practical implementation.

Furthermore, participatory research including farmers is often brought up in context with research for sustainable agriculture (e.g. Pretty, 1995 ; van de Fliert & Braun, 2002). Participatory approaches are especially helpful when it comes to the adoption of new technologies (e.g. resource conserving technologies): farmers are more likely to adopt these technologies if they have already been integrated into the development and implementation process (van de Fliert & Braun, 2002). One reason for this is that scientists experience quite different conditions than the farmers and therefore technologies developed only by scientists would need considerable adjustments before farmers would be able to adopt them (Pretty, 1995). In the context of the present study this relates to the acceptance of the measures among pig farmers and, as already mentioned before, their successful implementation on farms.

Challenges encountered in the course of the project

Besides expected benefits of (participatory) on-farm research, these approaches also bear some challenges and problems, which will be further elaborated in this chapter, using the project presented earlier as a case study.

Planning the implementation

In the first phase of the project measures to be implemented had been developed and finalized in a stakeholder workshop together with Austrian pig farmers. The idea was to discuss with the farmers about sustainability in pig farming and about the list of measures and, in the end, to find farmers interested in participating in the implementation part of the project. However, this turned out to be more difficult than expected as the majority of the farmers were reluctant to participating in this project. The reasons were diverse, ranging from ongoing structural changes on the

farms, concerns about possible negative (economic) consequences to current controversial political debate on pig housing and associated surgical interventions etc.

One major concern related to reduced farm income because fewer pigs can be sold due to the increased space allowance. Furthermore, farmers worried about the outbreak of tail-biting on their farms if they omit tail docking, which also entails higher costs for animal losses on the farm or condemned carcasses at the abattoir. In order to avoid any negative consequences for the participating farms, contracts had been drafted to guarantee the replacement of any financial loss or additional expenditure the farmers have through participation in the project. Although this financial compensation had been introduced already in the course of the workshop, the number of farmers interested in participating in the project was still very low. This indicates that also other factors than economic disadvantages influenced their decision.

Finally, three farms decided to participate in the project. Although a larger number of farms had been planned (about eight farms) the participation of only three farms offers other advantages: on the one hand a smaller number of farms enables to analyze each farm more in-depth. On the other hand, by studying more fattening cycles on each farm than originally intended, the anticipated number of pigs in the study can still be guaranteed.

Farmers were also very concerned about a severe outbreak of tail-biting on their farms. Tail-biting behavior is of a very complex and multifactorial nature (Schröder-Petersen & Simonsen, 2001); hence outbreaks can happen more or less unpredictably. Nevertheless, important risk factors are known and therefore appropriate measures can be taken to help preventing an outbreak. As a consequence the participating farms had been checked for risk factors using the SchwIP tool, a risk assessment tool developed at the Friedrich-Loeffler-Institut (FLI) in Germany (Madey et al., 2013). With the help of this tool, the overall risk for a tail-biting outbreak on the farms could be assessed and individual risk factors identified. The results showed that there is no serious risk for a tail-biting outbreak on all three participating farms. In addition to this risk assessment a decision tree was developed to help farmers in taking the right action in the event of tail-biting depending on the severity of the outbreak and the number of affected animals.

Subsequent to these preparatory steps, the study design had to be tailored to the conditions on the individual farms because conditions for the implementation of the measures differed between them. For example, concerning the measure 'omission of tail docking' farm-specific solutions had to be found. Farm 1 is a pure finishing unit and therefore has to buy the piglets from a breeding farm. However, the associated breeder refused to stop tail docking and therefore this measure could not be implemented on this farm. On farm 3 it was just the other way round: the farm comprises the breeding and fattening stage and used to not practice tail docking anyways, hence, on this farm all the pigs had intact tails.

The farms did not only differ in the implementation of the measures, but also in structural properties: Farm 1 is a very large fattening farm (1,400 fattening places) whereas the integrated Farm 3 is comparably small (160 fattening places); Farm 2 comprises about 650 fattening places and thus more or less resides in the middle between the other two. As already mentioned above Farm 1 is only keeps pigs in the fattening stage, whereas Farm 2 comprises also the rearing stage and Farm 3 is a combined farm, which includes the breeding stage as well. Hence, a comparison between the farms is not very meaningful and the farms will be analyzed individually. As already suggested, treating the farms as individual case studies enables a more in-depth analysis. In this context, the differences in farm properties are even beneficial. Above that, the fact that the pigs in Farm 1 and Farm 3 all have docked or intact tails, respectively, enables the analysis of additional aspects which would not have been possible in the original study design like e.g. looking at the influence of space allowance and enrichment material on tail lesions independent from tail length.

Another problem, which arose during the planning phase, was how to deal with the fact that due to the increase in space allowance fewer pigs are kept in the fattening pens. As a consequence, the farmer buys fewer piglets from the breeder and the integrated farm had to find a way to sell the surplus piglets, respectively. In this case the piglets were sold to an association, which buys and sells piglets across Austria. This is a very good example of problems farmers have to face when implementing the measures, which would maybe have not been that relevant for the management of a research station as experimental units might be able to better react to changing circumstances like this because they are used to conducting experiments with changing conditions.

A very crucial aspect of the preparatory phase was the trust building among the involved parties as there were different issues at stake for each of them. Trust building was facilitated by setting up contracts concerning the protection and anonymised use of farm data as well as the financial compensation of losses and additional costs on the one hand and to guarantee the correct implementation of the measures on the farms throughout the duration of the project on the other hand. Moreover, by working on the study design and its implementation on the farms together with the farmers and by valuing their concerns and practical knowledge mutual trust was strengthened. Also regular contact and exchange at meetings or over the phone was important for this process.

Challenges during the implementation period

As Sorensen and Hindhede (1997) stated, data collection should not interfere too much with the farmer's management. However, the researcher cannot be present on the farms during the whole implementation period and therefore some of the continuous data collection had to be assigned to the farmer. Therefore, importance and accuracy of needed data had to be critically weighed. One idea was to seize the given data sources on the farm to minimize the additional effort for the farmer. Automatic feeding computers for example can easily collect and save relevant feeding data. Furthermore, the farmer has to keep certain economic records and records about use of medications anyways. As a consequence, these data do not have to be collected separately, but maybe more detailed than usually (e.g. for each pen instead of for a whole batch of pigs).

A big issue when farmers and scientists work together are the differences in time planning horizons. Scientists usually plan very much in advance and like working in more or less predictable time frames, whereas farmers rather tend to do short-time planning and sometimes come to decisions at very short notice. For example, one farmer in the project decided on the dates for bringing the piglets to the fattening pens (which was always done jointly by farmers and researchers) or delivering them to the abattoir (data was also collected there by the researchers) only a few days in advance, depending on how far the pigs have grown. As a consequence, the researchers have to leave some room for flexibility in their planning or organize additional persons in charge of data collection, so they can alternate. On the other hand, researchers should also make farmers aware of their planning conditions and time frames in order to jointly find solutions fitting for both sides.

Furthermore, one farm sold some of the pigs to a small local butcher and therefore these pigs could not be assessed at the abattoir, which has to be taken into account for data analysis. However, stopping this long established deal between the farmer and the butcher would have entailed negative consequences for the small butchery and was therefore not an option. During the study period also some animals died due to the outbreak of diseases or injuries. On Farm 2 there were some test pens without the associated control pens. This originated from the fact that it is not possible to organize the exactly needed number of piglets with intact tails from the breeder due to differences in litter size, problems of grouping docked and undocked piglets in one pen and difficulties in selling undocked piglets to other fattening farms. Consequently, there were too many piglets with intact tails and hence too many test pens, which cannot be included in data analysis.

This shows that it is important to aim at including a higher number of animals in a study to withstand problems like these and still have enough pens and/or animals for data analysis.

Conclusions and recommendations for further research projects

When conducting on farm research flexibility plays an important role for different aspects. Study designs for example have to be flexible enough to be adapted to on-farm conditions without losing their scientific rigor. Although this might sometimes include the loss of some desired information it can at the same time create opportunities for answering other (similar) questions of interest in the context of the research topic. Furthermore, researchers should leave some room for flexible time planning in order to not interfere too much with the farmer's management.

In this case, contracts between all parties involved in the research project (university, the retailer and the farmers) were drafted to regulate financial compensations, data security and the fulfillment of assigned tasks. This is a very important aspect for trust building, which is essential when conducting on-farm research. Furthermore, using risk assessment tools and preparing information on what has to be done in case of a tail-biting outbreak also contributed to this trust building process. It showed the farmers that their concerns were being taken seriously and that they will be supported by the researchers when problems occur. Thus, taking steps to facilitate trust building among all involved parties, giving participating farmers the possibility to express their concerns and jointly finding ways to overcome them are essential elements of successful on-farm experiments.

Moreover, it has to be taken into account that the risk of losing information (e.g. animals/pens) for data analysis is much higher in on-farm experiments than in studies conducted under controlled environmental conditions on research stations. This has to be considered when planning the number of animals and pens used for the study.

In general it can be concluded that on-farm experiments are the method of choice when conducting research projects with a clearly applied focus and aiming at high external validity. Conclusions drawn from such experiments can be easier transferred to other commercial farms and farmers will perhaps be more willing to adopt technologies or tools developed under commercial conditions.

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