Application of an animal welfare assessment system for policy evaluation: Does the Farm Investment Scheme improve animal welfare in subsidised new stables?

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Abstract

The German National Assessment Catalogue for Animal Husbandry (NACAH) is a resource-based approach for a combined assessment of the effects of housing systems on the environment and on animal welfare. The effects on animal behaviour, as one aspect of animal welfare, are evaluated on the basis of indicators. They are classified according to the restriction of normal behaviour in each of the selected housing systems and then aggregated into three categories (A to C).

In Germany, many housings are constructed with subsidies from the Farm Investment Scheme (FIS), a measure of the EU Rural Development Programme. The FIS contains numerous goals including the improvement of animal welfare. We applied and adapted the NACAH to evaluate the effect of the FIS on animal behaviour for dairy cows and fattening pigs. Information on animal housing conditions before and after the investment was gathered in a representative telephone survey carried out in 2007.

Before the investment, dairy housing received a much better rating in the behavioural aspect of animal welfare than that for fattening pigs. In the new stables, the behavioural aspect did not change for 23 % of the dairy and 48 % of the pig farms, deteriorated on 3 % of dairy and 40 % of pig farms, and improved on 74 % of dairy and 12 % of pig farms.

Major efforts are thus necessary to improve animal welfare, especially for fattening pigs. These can not be limited to improved investment support but need to involve a variety of policy measures including consumer information and labelling.

Keywords: animal welfare, dairy cattle, farm investment support, fattening pigs, policy evaluation, resource-based welfare assessment

Zusammenfassung

Anwendung des Nationalen Bewertungsrahmens für die Politikevaluation: Wird mit der Investitionsförderung eine Verbesserung der Tiergerechtheit erreicht?

Mit dem Nationalen Bewertungsrahmen Tierhaltungsverfahren können die Auswirkungen unterschiedlicher Haltungsverfahren auf Umwelt und Tiergerechtheit bewertet werden. Die Wirkung auf einen Aspekt der Tiergerechtheit, das Tierverhalten, wird auf der Basis von Indikatoren bewertet. Die Klassifizierung der Indikatoren ist davon abhängig, in wieweit das Normalverhalten der Tiere durch ein Haltungsverfahren eingeschränkt wird.

In Deutschland werden viele Stallbauten über das Agrarinvestitionsförderungsprogramm (AFP) bezuschusst. Das AFP enthält eine Vielzahl von Zielen, wovon eines die „Verbesserung des Tierschutzes" ist. Im Rahmen der Evaluierung des AFP wurde der Bewertungsrahmen angewandt und angepasst, um zu untersuchen, ob die geförderten Milchvieh- und Mastschweineställe zu Verbesserungen im Bereich des Tierverhaltens führen.

Vor der Investition in den Stall wurde bei den Mastschweinen eine im Hinblick auf das Tierverhalten problematische Ausgangslage festgestellt, während die Milchviehbetriebe eine deutlich bessere Bewertung erhielten. In den neuen Ställen blieb der Aspekt des Tierverhaltens in 23 % der Milchvieh- und 48 % der Schweinemastbetriebe unverändert, verschlechterten sich in 3 % der Milchvieh- und 40 % der Schweinemastbetriebe und verbesserten sich in 74 % der Milchvieh- und 12 % der Schweinemastbetriebe.

Deutliche Anstrengungen sind daher notwendig, um insbesondere in der Schweinemast die Tiergerechtheit zu verbessern. Für eine erfolgreiche Strategie ist nicht nur eine Anpassung des AFP notwendig, zusätzlich sollte eine Kombination mit anderen Maßnahmen wie etwa Konsumenteninformation, Produktkennzeichnung und Prämien geprüft werden.

Schlüsselworte: Agrarinvestitionsförderungsprogramm, Evaluation, Haltungsverfahren, Mastschweine, Milchvieh, Tiergerechtheit, Tierverhalten

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Introduction

While consumers in Germany believe that farm animal welfare is one of the most important tasks of modern agriculture (TNS Emnid, 2007), the issue appears to be, at best, a secondary goal in agricultural policies. One particular measure that includes animal welfare in its set of objectives is the Farm Investment Support (FIS) scheme, which attempts primarily to improve the competitiveness of the agricultural sector. Farmers participating in the scheme receive a contribution ranging from 20 % to 35 % of their investment costs. Most dairy and an important number of pig housings are constructed with subsidies from the FIS, a measure of the EU Rural Development Programme.

Due to European Commission requirements, FIS is subject to regular evaluations. The ex-post evaluation of FIS covers farm income aspects, productivity, diversification, structural and environmental effects, and animal welfare. To analyse the impact of the FIS on the behavioural aspect of animal welfare we:

- assess the state of animal behaviour in the dairy and fattening pig housing before and after the investments,
- draw conclusions on the effectiveness of FIS, and
- develop recommendations for a targeted policy approach for the improvement of animal welfare.

The Farm Investment Support measure

The Farm Investment Support measure has existed in Germany since the early 1970s and has undergone a number of modifications in recent decades. Although it is now a measure of the EU Rural Development Programme, its core activity has remained unchanged over the years: to provide subsidies for the construction and modernisation of animal housing. The FIS budget (public funds) amounted to € 1.34 billion during the period 2000 to 2006. The largest share of these funds was disbursed for the construction of dairy housings followed by pig fattening stables. In Germany, 11 000 dairy and 2 400 pig housings were subsidised by the FIS in the years 2000 to 2006.

Animal welfare is considered in the regulation in two different ways. First, housing systems such as tethered stalls and battery cages for laying hens are exempt from support. Secondly, increased subsidy (+10 %) is attributed to those farms which fulfil particular 'construction requirements for animal-friendly housing' as defined in an Annex of the regulation. For large investments, the subsidy can amount to 30 %, while up to 35 % is available for small investments (Deutscher Bundestag, 2001). For dairy stables, the criteria defined in the Annex are 'state of the art', for example, requiring one feeding place and one cubicle per cow, a minimum space allotment of 5 m² per cow, sufficiently wide passages, and the potential to install a comfortable surface in the cubicles. The requirements for fattening pigs, however, exceed standard systems with respect to space allowance and system requirements. Here, for example, an animal-feeding space ratio of 6:1, a minimum size group of 20 pigs, separate lying areas with litter or a soft mattress, a minimum space allotment of 1 m² for pigs of more than 60 kg, and access to manipulable material are required. As a consequence, nearly all subsidised dairy housings but hardly any fattening pig stables have received the increased support.

Concepts for the assessment of animal welfare

Animal welfare is multidimensional and cannot be measured directly, rather it is inferred from external parameters (Blokhuis et al., 2003). Different approaches are available for the assessment of farm animal welfare. In animal-based methods, welfare is observed at the level of the individual animal for which a multitude of behavioural and health indicators are examined. In environment- or resource-based methods, information gathered from the properties of housing conditions (e.g., space allowance) is used to assess whether the prerequisites for animal welfare are met (Bartussek, 1996, Sundrum et al., 1994). Although it is generally accepted that the most valid assessment of animal welfare is obtained when animal and environment based parameters are combined, the decision about the most suitable methodology depends on what the method is intended to measure (Johnsen, Johannesson, Sandee, 2001). Animal-based methods have the advantage of registering the state of the animal itself, but the recording of animal based parameters demands considerable resources, the interpretation of results may be difficult and reliability can be a problem (Knierim, Winckler, 2008; Napolitano et al., 2005; Sundrum, 1998). As animal based methods are time consuming, they can only provide results for a very limited number of farms/animals (Knierim, Winckler, 2008; Pflanz, 2007). Environment-based methods can provide evidence for larger samples and, thus, are more appropriate for the purpose of policy evaluation.

Animal welfare does not only depend on the housing system but also on management: for example, on the qualifications and individual attitude of the farmer. In particular, the health of animals is considered to be mainly influenced by management, while animal behaviour is related more strongly to housing systems because the construction properties (e.g., space allowance, floor quality) are prerequisites for the performance or non-performance of certain behaviours.

In the evaluation of investment support for new housing, therefore, we focused on the effects of housing conditions on animal behaviour as one important aspect of

animal welfare. We used the criteria of the National Assessment Catalogue for Animal Husbandry (KTBL, 2006) to evaluate the effect of the FIS on animal behaviour in stables for dairy cows and fattening pigs, the two most important areas of investment support.

Materials and methods

The National Assessment Catalogue for Animal Husbandry

The National Assessment Catalogue for Animal Husbandry (NACAH) is a resource-based method developed for a combined assessment of the effects of housing systems on the environment and animal welfare (KTBL, 2006). The assessment of animal welfare is based on the research findings as well as judgements of a group of 37 scientists and representatives from different interest groups (agricultural and animal welfare lobbies, administering organisations and Ministries). Behavioural indicators, structured according to functional systems, are applied to evaluate the effects of the different housing systems on animal behaviour. In total, standardised values (i.e., space allowance, floor quality) are defined for 139 housing systems for different types of animals; of these, 18 are defined for dairy cows and nine for fattening pigs.

Each functional system contains a number of indicators which can vary depending on species of animal, specialisation of production and housing system (Table 1). For example, reproductive behaviour is not an issue for fattening pigs which, on the other hand, receive two additional indicators in the functional system 'feeding'.

The underlying assumption of the NACAH is that different housing systems restrict animal behaviour to different extents. The indicators are classified into three grades with regard to the restriction of normal behaviour. Accordingly, behaviour is:

– unrestricted,
– restricted, or
– strongly restricted/not executable.

This assessment relies heavily on existing animal-based research studies carried out for different species. Normal behaviour for the indicator 'running', for example, is assessed to be 'unrestricted' for dairy cows, if they are kept on permanent pasture or in loose housing with more than 5 m^2 per livestock unit (LU). For temporary pasture and loose housing with less than 5 m^2 per LU, normal behaviour is assessed to be 'restricted' and, in tethered stalls, it is 'strongly restricted/not executable'. Literature exploited for this indicator encompasses Bogner and Grauvogl (1984), Fiedler (2003), Irps (1985), Jensen and Kyhn (2000), Krohn, Munksgaard and Jonasen (1992), Madsen and Nielsen (1985), Raasch, Huhn and Tuchscherer (2000), Schrader et al. (2001), Sundrum and Rubelowski (2001), Tuyttens (2005), Wilson et al.(1999).

Table 1:
Indicators for the assessment of animal behaviour in housing systems for dairy cows and fattening pigs

Functional system	Indicator	dairy cows	fattening pigs
1. social behaviour	group	✓	✓
	social structure	✓	✓
	social contact	✓	✓
	possibility to withdraw	✓*	✓
2. locomotion	walking	✓	✓
	running	✓	✓
	running fast	✓	✓
	turning around	✓	✓
3. rest and sleep	lay down/get up	✓	✓
	choice of resting place	✓	✓
	resting in a stretched position	✓	✓
	undisturbed resting and sleeping	✓	✓
4. feeding	feed selection/rooting	✓	✓
	feed intake	✓	✓
	water intake	✓	✓
	undisturbed feed intake	✓	✓
	manipulation of feed	-	✓
	manipulation of other objects	-	✓
5. elimination	defecation, urination	✓	✓
6. reproductive behaviour	jumping behaviour	✓	-
	separation for birth	✓	-
	behaviour during birth	✓	-
7. comfort behaviour	auto-grooming	✓	✓
	grooming on objects	✓	✓
	thermoregulation (cooling)	✓	✓
	thermoregulation (heat supply)	✓	✓
8. exploration	orientation/exploration	✓	✓

*except tethered stalls

The indicator grades are aggregated into three categories (A to C) which allow for a simple assessment of different housing systems. The aggregation procedure was agreed upon by the scientists and representatives from interest groups involved in the conception of NACAH and follows the principles:

A: No indicator has received the grade 'strongly restricted/not executable' and less then three indicators received the grade 'restricted', with a maximum of two in one functional system,
B: Housing systems fall into neither categories A nor C,
C: In more than 50 % of the functional systems, the indicators received the grade 'strongly restricted/not executable'.

These rules for aggregation were chosen in order not to weight the different indicators or functional systems, and to avoid deficits in one functional system being compensated for by the advantages in another functional system.

Adaption of the aggregation and parameterisation of the indicators of NACAH

The original NACAH-classification is limited to three categories and it additionally has the disadvantage of ranking the most common housing systems in just one of these categories. For dairy, all loose houses (with or without pasture) are classified "B" while for fattening pigs all pens with fully slatted floor fall into category C. In order to enable a better differentiation between housing systems, we developed new aggregation criteria. The adapted assessment counts the number of functional systems in which no indicator is judged 'strongly restricted/not executable' and > = 50 % of the indicators are rated 'unconfined'. This aggregation results in a range of 0 to 8 categories.

As the NACAH was not developed as an ex-post evaluation instrument, it contains a limited number of housing systems with fixed attributes. In practice, however, there is a much larger variation in such systems, not only with respect to space allowance but also regarding equipment, for instance, with different devices for feeding, drinking and enrichment objects. To incorporate this diversity into the assessment, it was necessary to parameterise the NACAH at the level of the indicators. To this aim, existing criteria catalogues (accessible on http://daten.ktbl.de/nbr/ with a code received by purchasing the book) were complemented, where necessary, by threshold values and delimitations (for a description of parameters for all indicators see Margarian et al., 2008).

Data sampling and analysis

For the application of the NACAH, information on animal housing conditions (housing system, space allowance, feeding technology, etc) before and after the investment was necessary. As these data were not available from statistics or FIS monitoring, a survey was carried out. To exclude minor amendments to stables, only farms with large investments of more than € 100,000 in housing systems were selected for the survey. The survey was limited to dairy and pig fattening housings.

The survey was originally planned as a national undertaking but, for data reasons (quality, availability), the city states (Berlin, Bremen, Hamburg) and some Federal States (Saarland, Saxony, Thuringia) had to be excluded. Data collection was carried out by telephone interviews in 2007. Dairy farms which had carried out an investment in a stable between 2003 and 2006 were selected in a random disproportional sample, stratified according farm size (animal numbers) and Federal States. This was important, as the largest part of FIS funding goes to the southern Federal States which would have dominated the results in a proportionate sampling procedure. As the number of subsidised pig fattening stables was limited, a complete survey was carried out of all farms which had undertaken investment in a pig fattening housing between 2000 and 2006. Additionally a small sample of pig fattening farms which had constructed a new housing without investment support was included in the survey.

The questionnaires were developed in cooperation with the Centre for Survey Design and Methodology (GESIS – the Leibniz Institute for the Social Sciences, Mannheim, Germany) and husbandry experts. Pre-tests were carried out with dairy and pig farmers. In addition to the detailed questions on housing conditions, a question was included in order to get some idea of the deadweight involved in the subsidy (Would you have carried out the investment in the housing without the subsidy?). Furthermore the farmers were asked about their evaluation of changes in animal health.

With a drop-out rate of about 60 % of the interviewees, the number of analysable questionnaires amounted to 320 for the dairy farms, representing a share of 18 % of the population of assisted dairy farms. For the pig farms, 209 complete questionnaires were available, accounting for 32 % of the assisted pig fattening farms. Additionally data for 25 pig fattening farms which have invested into a new housing without subsidy is available.

We used the Wilcoxon signed-rank test for paired samples to test for differences between the assessments before and after investment (subsidised and non-subsidised housing).

Results and discussion

Changes in housing systems for dairy cows

Before investment, 40 % of the farms kept their dairy cows in tethered stalls. If the number of dairy cows per farm is taken into account, however, it becomes evident that the tethered stall is the dominant housing system only on farms with less than 50 cows while it is of very limited importance in the other farm size categories. In terms of animal numbers, 19 % of the dairy cows were kept in this system. As expected, tethered stalls do not exist after investment, as this housing system is excluded from the subsidy (Figure 1).

With respect to the prevalence of systems with pasture, the survey revealed that the share of farms with permanent indoor housing increased from 53 % to 57 %. Those farms which had tethered stalls without pasture before

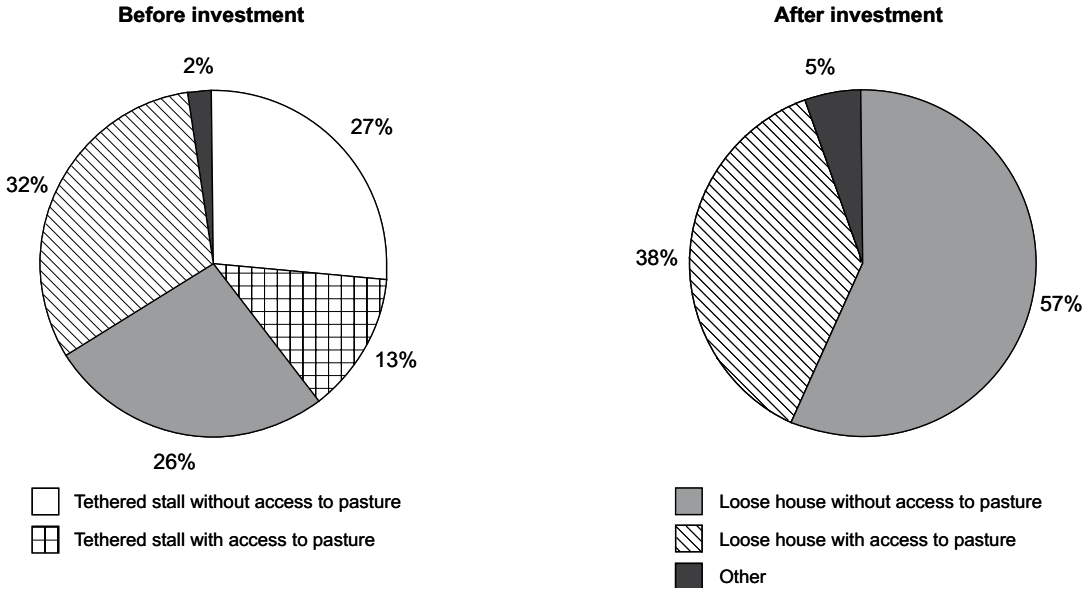

Figure 1:
Housing systems for dairy cows before and after investment

investment usually had loose stalls without pasture after investment. The housing system, therefore, does not seem to be the determining factor in this regard. Most likely, it is the extent to which pasture on the farm is close to the stable that is of high importance.

Changes in housing systems for fattening pigs

For fattening pigs, the most common housing system, the pen with fully slatted floor, increased from 50 % to 73 % of farms (Figure 2).

There was also an increase in open stables which were present on 10 % of the farms after investment. In contrast, the proportion of housings with pens with slatted floor and solid lying area – which were the second in importance before investment – decreased after investment. This housing system was particularly common on small (<400 fattening pigs) and medium (400 to 800 fattening pigs) farms. On the larger farms with more than 800 pigs, which predominantly had pens with fully slatted floors, there was only little change with respect to the housing system.

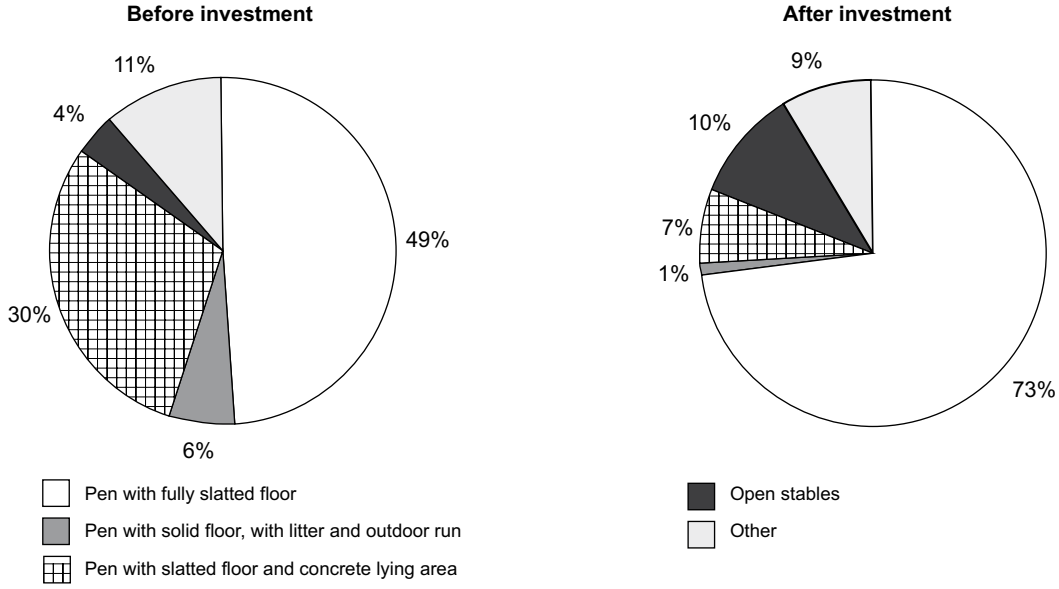

Figure 2:
Housing systems for fattening pigs before and after investment

Results of the NACAH assessment

The examination of survey data before and after investment already provides some indication of assessment in terms of animal behaviour. For instance, for dairy cows, the abandonment of tethered stalls will in most cases be linked to an improvement in animal behaviour. Aside from the stable itself, however, other components of the housing system are also important, such as, in the case of cows, the availability of comfortable bedding (straw or soft mats) or ventilation. For fattening pigs, the availability of adequate enrichment objects and the feeding technology are of importance. Space allowance is an issue for all species.

The application of NACAH reveals fundamental differences with regard to the aspect behaviour of dairy cows and fattening pigs. While more than 72 % of the dairy housings were rated 'B' before investment, 87 % of the pig stables were rated in category 'C', the lowest possible grade. After investment, the behavioural aspect remained unchanged on pig farms, but was improved on dairy farms which were all classified in category 'B'. This result reveals a major weakness of the methodology: only very substantial changes, such as the abandonment of tethered stalls, can be indicated, while numerous alterations in the housing system with respect to pasture, space allowance, etc, do not become apparent.

Table 2:

Assessment of animal behaviour before and after investment according to the NACAH (percentage share of farms in categories A, B and C)

	Dairy cows		Fattening pigs	
	old stable	new stable	old stable	new stable
A	0	0	0	0
B	72	100	13	13
C	28	0	87	87

Using the adapted aggregation, which counts the number of positively evaluated functional systems, a more accurate picture of the situation before and after the investment into the new stable can be drawn (Figure 3). In pig production, the behaviour of the animals was highly constrained in the initial situation. In more than 50 % of the housings, normal behaviour was severely restricted in all functional systems. After investment, the situation deteriorates even further with over 70 % of the stables in this category[1].

In dairy production, the situation was different. Less than 30 % of the housings were classified in the 'poor' categories (0 to 2 positively-rated functional systems) before investment, and, due to the abandonment of tethered-stalls, there were no cases in these categories after investment. When farm sizes were included in the analysis, it became

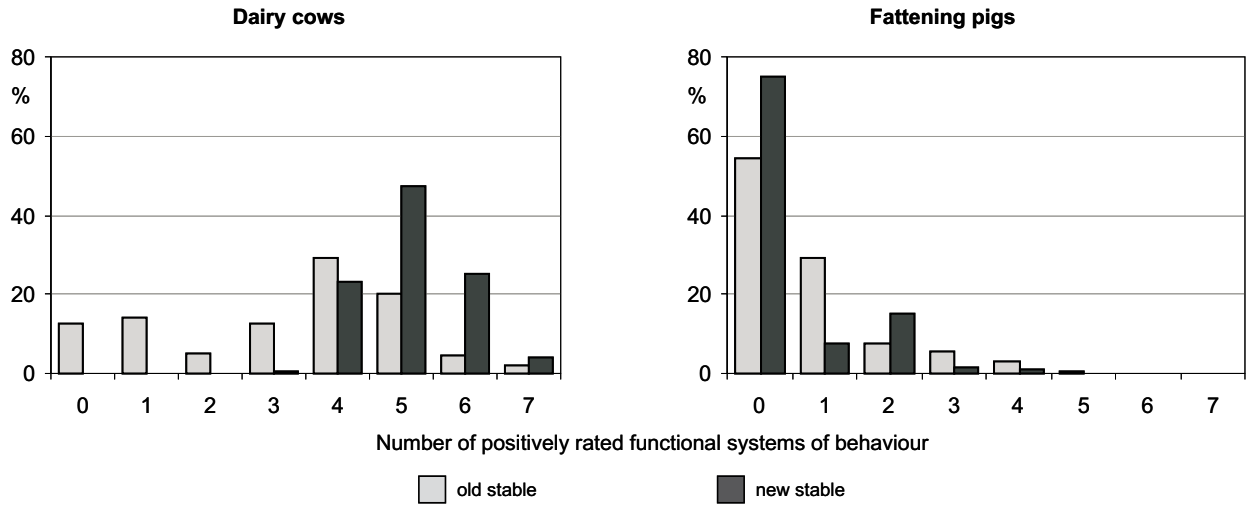

Figure 3:

Assessment of animal behaviour before and after the investment based on the new aggregation method (percentage of stables with 0 - 7 positively evaluated functional systems)

[1] The difference between the results of the original NACAH-aggregation ('no change') and the adapted aggregation ('deterioration') is due to the fact that the new aggregation is more apt in depicting smaller changes. After investment, pens with slatted floors and a concrete lying area have been replaced by pens with fully slatted floors (see Figure 2), which results in further restrictions in animal behaviour.

evident that the important improvements mainly occurred on the smaller farms of less than 40 dairy cows.

Within certain housing systems, we can observe small improvements for dairy cows and fattening pigs. In loose stalls for dairy cows, this arises from the increased number and size of cubicles, as well as wider passages. In pens with fully slatted floor for fattening pigs, the improvements can be attributed to the increased supply of objects and showers, and larger space allowance. It has to be taken into account that environment-based methods may have difficulties in capturing differences in animal welfare within housing systems (Mollenhorst et al., 2005). While minor improvements have been shown due to changes within a housing system, the general observed effects mainly relate to the change from one housing system to another. Although the situation improved in 74 % of the dairy stables, this was the case for only 12 % of pig housings. Deteriorations were measured in 40 % of pig stables (3 % of dairy housings) and the situation remained constant in 48 % of pig stables (23 % of dairy housings).

The difference between the assessed grades before and after investment was significant in the case of both dairy and pigs (Wilcoxon: dairy $n = 320$, $W = 25\,680$, $P < 0.0001$; pig fattening $n = 210$, $W = 19\,530$, $P < 0.0001$).

The net effect of FIS

Up to now we have only investigated the effects of the subsidised investment. To estimate the effect of the subsidy itself (the net effect), we need to know what the farmers would have done without the subsidy and if a housing built without subsidy would differ to one constructed with FIS:

- The decision to build may have been influenced by the subsidy but it is also possible that the farmer would have made his investment without it. To identify the deadweight, the farmers were asked about their strategies. The results indicate that about 50 % of the pig farmers and 45 % of the dairy farmers would have constructed the stables even without investment support.
- When comparing the assessment of animal behaviour of FIS subsidised stables with that of a control group of investments without subsidy, no significant difference between the two groups can be determined (Wilcoxon: $n_{FIS} = 72$, $n_{no\text{-}FIS} = 25$, $S = 0.21$, $P < 0.001$). Due to the fact that nearly all dairy stables in Germany are build with FIS, this experimental control was only possible for fattening pigs.

As a result, a positive or negative effect of FIS can be assumed especially on those farms which would not have invested without the subsidy and which would have continued production in the old stable.

Discussion

While the assessment of animal behaviour is in general plausible and traceable (from the literature sources) at the level of the indicators, the original aggregation of NACAH is not suitable for the evaluation of the effects of FIS on animal welfare. The small number of grades and the aggregation mechanism which does not even exploit those three categories might also prove inappropriate for other purposes. The altered assessment method of the NACAH provides a clearer picture of the situation regarding animal behaviour before and after the investment than the "original" NACAH aggregation. Some limitations to the approach are:

- The general criticism of environment-based methods is that they are not able to assess the animal welfare situation but, basically, only delineate the prerequisites of certain behavioural performance. The validity of the results of environment-based methods for assessing differences between housing systems has so far only been demonstrated exemplarily (Mollenhorst et al., 2005). Further comparisons of the results achieved using environment-based and animal-based methodology on the same sample of farms would help to lessen this problem.
- The suitable reference value for an assessment of animal behaviour before and after investment would be the 'number or animals' for which housing conditions have been improved. This is not feasible because most farms increase the number of animals in the course of an investment, and a reference housing system for the restocked animals is not available. Therefore, all statements have to be related to the number of farms or new stables and not to the number of animals.
- In our survey, the proportion of animals kept in the new housings after investment was 85 % for dairy and 73 % for fattening pigs. The remaining 15 % of dairy cows and 27 % of fattening pigs continued to be kept in the old stables after investment. The assessment is therefore relevant for a large share of, but not all, animals.
- The defined criteria and threshold values for assessment of animal welfare at the level of some indicators are not yet scientifically well-grounded. In relation to a number of issues (eg, group size in pig fattening housings), there is still little information as to their effect on animal behaviour.
- The altered NACAH aggregation of indicators is just one in a wide variety of aggregation options and underlying concepts (Botreau et al., 2007). While some aggregations use a weighting mechanism which allows for compensation between welfare aspects, others attribute the same importance to all aspects. Although full compensation is regarded critically, the proposition

that all welfare aspects are equally important for all species is not only implausible from an anthropocentric perspective, but it has been disproved in experiments, such as those with demand tests (Mason, 2001).
– As changes in animal health can occur as a consequence of new housing, a more complete picture of animal welfare would be achieved if animal health was included in the analysis. Although this aspect has not been measured in on-farm epidemiological studies, the assessment of the farmers of changes in animal health after the investment into a new housing can give a first indication. The survey results suggest that in both dairy and pig fattening farms, animal health improved in about half and remained constant in about 40 % of the farms. In less than 10 % of the farms the farmers reported a deterioration (the remainder had no opinion).

Conclusions

Animal welfare implications

While small improvements in animal behaviour are related to changes within a given housing system, the general observed effects were mainly due to the change from one housing system to another. This led to improvement in a large proportion of dairy housings and a deterioration in 40 % of pig stables.

In its actual design, the FIS does not achieve substantial improvements in the behavioural aspect of animal welfare at the farm level. Important ameliorations on the dairy farms are due to the abandonment of tethered stalls – a form of husbandry which is set to diminish even without policy intervention in the mid-term. On the pig fattening farms, restrictions in animal behaviour are a much more severe problem and the FIS cannot account for any improvement. On the contrary, the situation deteriorates further.

The two most important determinants of the limited impact of FIS with respect to improvements in animal welfare are:
– The 'construction requirements for animal-friendly housing' defined in the Annex of the FIS regulation do not reflect the level of knowledge with respect to welfare-friendly housing systems. For dairy housing they are 'state of the art technology'.
– For fattening pigs, the criteria in the Annex lead to higher current costs of production, so that only farms that are able to sell their meat in special (high-price) distribution channels are able and willing to implement this measure.

Methodological implications

A wide range of policies is applied with the aim of improving animal welfare in the EU member states. Nevertheless a 'ready for use' methodology to measure the effects of these policies on animal health and animal behaviour, which is generally accepted by the scientific community, is not available. The application of NACAH has demonstrated that an assessment of animal behaviour is possible even under the financial constraints and the time pressure of policy evaluation. More research is needed to validate this kind of approach and to test the inclusion of health aspects into the assessment while remaining within the scope of policy evaluation.

Policy implications

A considerable effort will be necessary to achieve noteworthy achievements in the field of animal welfare. A successful policy for the promotion of welfare-friendly housing systems cannot be limited to FIS but will require a strategic approach involving a set of different instruments. Schemes need to be developed for the different species and specialisations of production:
– Existing legislation has to be scrutinised and tightened where necessary (EFSA, 2005).
– Guidelines for welfare-friendly housing systems should be further developed by scientists and experts.
– Consumers need to obtain information about animal production and the implications of different housing systems. To translate this information into a willingness to pay for the more expensive products from welfare-friendly systems, this measure should be linked to an easily understandable and transparent labelling campaign (see also Isermeyer and Schrader, 2005).
– A precise definition of investments which lead to improvements in animal welfare is a precondition for a targeted FIS (the guidelines should be used here).
– If a rise in production costs is the result of welfare-friendly housing systems and consumers are not prepared to pay higher prices, payments to compensate for the additional costs could be envisaged (Aragrande et al., 2006, European Commission, 2003).

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