



## Final Report

For DARCOF II research projects financed by grants from  
The Directorate for Food, Fisheries and Agro Business  
under the Danish Ministry of Food, Agriculture and Fisheries

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### 1. Research program

Research in organic farming 2000-2005 (DARCOF II)

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### 2. Project title and number

Poultry Production Systems- Health and Welfare FØJOII-6

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## 6. Project period (month, year)

Start of project: December 2000  
End of project: June 2005

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## 7. Final report

### A. Project summary

The organic egg production in Denmark has the fundamental problem that the breeding birds, which are available has been genetic adapted to the conventional production in cages. This harms the welfare of the birds and the income of the farmer. There have not yet been identified breeds of poultry that is particularly suitable for organic egg production. In the research, there are pointed at few breeds, which are directly unusable. Further, there has been found co-variation between the health of the hens and the system of rearing. It is therefore important continuously to improve the conditions in which the chickens have been raised. Finally, a population of hens, selected for low tendency to feather pecking, has shown a considerable better feed efficiency.

**Table A.1: Work package list (from application)**

| No. | Work package title  | Participants*         | Budget<br>(1.000 DKK) | Start | End  | Deliverable<br>no(s): |
|-----|---|-----------------------|-----------------------|-------|------|-----------------------|
| 1   | Breed performances and welfare at farm level  | <u>JBK</u> , PS, GS   | 1270                  | 2001  | 2005 | D1-D4                 |
| 2   | Studies on disease incidence and the significance of diseases and interaction in organic free-range poultry | <u>APE</u> , NME, JPC | 1590                  | 2001  | 2004 | D5-D13                |
| 3   | Genetics of feather pecking, and breed performance at experimental level                                    | <u>PSO</u> , JBK, GS  | 1020                  | 2000  | 2003 | D14-D15               |
| 4   | Breed performances and welfare of table chickens  | <u>BLN</u>            | 660                   | 2001  | 2002 | D16-D17               |
| 5   | Farmer compensation, experimental farms and consultancy.  | <u>PSO</u>            | 850                   | 2000  | 2004 |                       |
| 6   | Co-ordination and management of the project   | <u>PSO</u>            | 240                   | 2000  | 2005 |                       |

\* Responsible participants are underlined

### B. Objectives and expected achievements

The objectives of the proposal is to obtain knowledge needed to improve the welfare of organic reared poultry and give the producer at better and less variable income. That will be carried out through investigating the problems related to management, production, health and their interactions using different breeds of laying hens and table chickens held in organic free-range system.

In particular:

- To create knowledge about the suitability of the existing breeding materials regarding table egg production under organic principles on farm level.
- To conclude investigations about the genetic mechanisms in laying hens, having influence on feather pecking and cannibalism, to an extent that commercial breeding companies can use this in their breeding programmes.

- To identify elements in the management and environments which will improve the welfare of the birds
- To investigate the incidence (occurrence) of diseases in organic table egg production systems and to relate disease prevalence and management system
- To investigate the interaction between diseases
- To develop strategies to improve disease prophylaxis in organic poultry production
- To examine the relationship between availability and use of perches in table chickens of different breeds and the time budget of the birds and the incidence of breast blisters as parameters for welfare.

## **C. Progress and results**

### **C.1 Description (summary) of main results and conclusions**

**Work package 1** Four farmers were identified and agreement were obtained with each of them that they were willing to divide his facilities into two parts in order to keep two different strains of hens and record laying and feed intake separately in a firm pattern. The situation was as follows:

FARM 1 Situated in Vendsyssel. Contract established and agreement obtained that they should compare ISA Brown and LSL. After a period with much diseases the owner decided to stop with this flock already after 9 months, and no further research is done on this farm.

FARM 2 is situated in Vest Jylland. Agreement was obtained regarding the first batch to compare the breeds Hellevad and ISA Brown, each in a number of 3.000. They were hatched medio oktober 2001 and reared at Bredahl Fjerkræ and transferred to Farm 2 at the age of 16 weeks and the hen started to lay in februar 2002 and they were stopped 9 month later due to salmonella infection. The next batch consists of Lohmann Brown and Lohmann Tradition and they started rearing in October 2002 at Asta Bredahl and they were placed ultimo februar 2003. The third and last batch will consist of Hyline White and Hyline Brown. They will be placed as dayold at The Bredahls in oktober 2003 and started at 13<sup>th</sup> Febr 2004 as laying hens.

FARM 3 is situated at the west coast of Vendsyssel. Agreement on Isa Brown and Hyline Brown in a number of 3.000 for each breed was obtained and they started rearing at Bredahl Fjerkræ primo March 2002 and were transferred to Farm 3 in June 2002 and run for a complete period. The next batch consists of Isa Brown and Lohmann Silver, they were hatched ultimo Feb 2003 and placed at Farm 3 medio june 2003.

On Farm 4 situated in Mid-Jutland we made an agreement of keeping the birds. One batch was started ultimo march 2003 with Lohmann Silver and Babcock.

Thus in total 8 different breeds has been tested par wise. One of these was represented three times, two of the breeds were tested twice and the other 5 breeds only one time.

Protocols for the behavioural and clinical recordings involves visit four times during a batch in which the behavioural and welfare are recorded. The health is followed by post mortem investigation of all dead birds from Workpakage 2. If special diseases shows up a closer contacts in forms of visits etc. takes place. Production data is withdrawn from the E-control run by the Danish Poultry Council in which some detail data on the individual flock can be found. In addition we got the data from the Egg Packing unit regarding detailed data on quality of the eggs.

The results of welfare observations has so far resulted in a Publication in FØJO-nyt and presented at a farmer-seminar in May 2005 and the main conclusion is that regarding feather pecking there was some difference as two breeds showed particular poorer feather cover while other three showed a better feather cover the three residual was in between. Regarding the use of outdoor facilities there was again two breeds that had a very poor utilisation and other two with a very good utilisation. The problem is that it is not the same breeds that had the preferred behaviour for both of the welfare parameters.

Two publications on this work package together with data of an **on station** test of the various breeds carried out under WP 3 is in the process of been analysed and will appear at the end of 2006.

**Workpackage 2.** One interaction study has been carried out between *Ascaridia galli* and *Salmonella* in chickens. The study has shown that the interaction between *Ascaridia galli* and *Salmonella* create *Salmonella* carrier animals enhancing the zoonotic aspects of *Salmonella*. At the moment two papers are in the process of being written and it is expected to submit both papers in the beginning of year 2006.

Post mortem examinations of dead birds from Farm 1 were finished in July as the chickens were slaughtered at that time. The mortality reached 91% at Farm 1 due to outbreaks of *Pasteurella multocida* and *Erysipelothrix rhusiopathiae*. Molecular characterization of several isolates of above mentioned agents has been done and demonstrated establishment and spread of a successful clone of *P. multocida* spp. *multocida* and *E. rhusiopathia*, respectively. In addition, it was demonstrated that these two pathogens might cause severe losses in free-range chickens with a mortality rate as high as 91%. A publication has been accepted on that subject.

Cohort studies in 14 farms with layers have been carried out. In total 10 farms with organic production and 4 farms with deep litter production are included in the study. Data handling and analysing are in the process at the moment. The intention is to publish one paper on the studies on causes on mortality in free-range chickens in Denmark and to elucidate the possible relationship between diseases prevalence and production systems medio 2006. In three of the organic farms a high mortality was initiated shortly after the start of the production period due to an outbreak of Histomoniasis. A high number of the chickens submitted for post mortem were concurrently infected with E.coli. At present profiles of several of the isolates of E. coli is running (one publication is in the process of being written). In addition, high mortality was observed at the end of the production period in 1 of the 3 flocks, which had a previous outbreak of Histomoniasis. This high mortality was demonstrated to be associated with an outbreak of *Erysipelothrix rhusiopathia*. The intension is to deliver one publication about clonal stability of *E. rhusiopathia* in free-range layer as outbreak of *E. rhusiopathia* had been observed at two farms in WP2. From all 14 farms in the cohort study serum samples have been collected and serological profiles for selected diseases have been determined. The results from this serological survey will be included in the paper which present the other result from the cohort study.

**Workpackage 3.** Feather pecking behaviour of 30 week old hens from three generations were recorded (Generation 5, 6 and 7). In each line were recorded about 200 hens per generation and among them 30 hens were selected as mothers of next generation and among 50 full-brothers 10 cocks were chosen according to the performance of there sisters. Recordings were made in mixed groups consisting of 10 high- and 10 low feather pecking line birds. The videotapes from three hours of behavioural observations were analysed and the breeding values estimated. After selection, insemination and collection of hatching eggs, the next generation of pedigreed birds were

hatched. This basic work were done and reported in Kjaer et al. (2001) and Su et al. (2005)

Clinical examinations of generation 5 adult hens revealed a higher body weight of the control line compared to both selection lines. Selection lines did not differ from each other with respect to body weight, but the level of feather pecking was significantly higher in the high-line, medium in the control and lowest in the low-line, as expected.

Parents of generation 5 have produced chickens for an investigation on individual egg recording, feed intake and weight of body during a 4 week observation period. Data analysis showed that selection for feather pecking is genetically correlated to feed efficiency and in particular to the need for maintenance and the two selected lines deviated by more than 10% regarding feed intake adjusted for egg production and a possible weight gain. The control line was intermediary in between the two selected lines. This is new knowledge and supplied with an evaluation of the plumage score it was concluded that more than half of the differences between the selected lines regarding feed efficiency was due to a better plumage cover of the low feather pecking line. These findings will appear in the February issue of Poultry Science (Su et al. ,2006).

Parents of generation 5 of selection lines as well as control line produced 1500 chickens. A contract with a commercial farmer was made and a complete rearing unit with 48 pens was built. Chickens were placed in the unit in July 2002. Recordings of feather pecking, general activity, pecking to inanimate stimuli (string and feather bunch) and egg production has been done. With regard to individual laying pattern an electronic system for recording of individual laying pattern in loose housed layers has been developed. This electronic equipment has been used to perform a more detailed study of the activity pattern and litter preferences of individual birds from the three lines. Two mixed line groups of 180 birds each has been housed in pens with antennas on the floor. In this way we will be able to record the movement of single birds and thereby estimate the relative general activity. Birds from the high feather pecking line seem to prefer straw (they spend more time in the straw pens) than birds from the control and low feather pecking lines. Also we have been able to show that high feather pecking birds have a higher general activity, which support our earlier findings of lower feed efficiency in this line. Part of this work was reported by Kjaer and Jong, (2005) at an international symposium in Poland.

Eggs from 5 international breeds were incubated, the chicken reared and the hens tested in an on-station tested at Research Centre Foulum, in which each breed were repeated four times. Recording of feather pecking, plumage condition and egg production and egg quality was performed and the results will be published during 2006 together with data from WP 1.

**Workpackage 4.** Two simultaneous experiments were carried out from 9th of April to 2nd of July 2002. In the first experiment two strains were compared: i657, which is the strain conventionally used for organic table chicken production in Denmark, and Labresse, which is a dual-purpose strain of French origin. Both strains were kept according to the rules for organic table chicken production in Denmark (e.g. they had access to perches from day-old and roughage available from 3 days of age, outdoor access from 6 weeks of age and were slaughtered at 84 days of age). In the second experiment, only i657 birds were used. They were kept in 12 groups of 50, and had access to either 0, 7.5 or 15 cm of perch space per bird throughout the rearing period. In both trials, perch use was recorded using video equipment, the use of outdoor areas was recorded by behavioural observations using a time sampling technique, and data on breast blisters, foot pad lesions, dermatitis and production parameters were obtained at slaughter

The prevalence of breast blisters was significantly higher in the Labresse strain (42%), which is currently not used for organic production in Denmark. The prevalence of breast blisters in the i657 strain, which is the most commonly used strain for organic production in Denmark, was approx. 16%, of which 7% would cause downgrading of the carcass and may be assumed to be uncomfortable for the birds. However, the latter was associated with the ability to perch, and a different perch design may alleviate the occurrence of severe breast blisters. Thus, i657 is the most suitable for organic table chicken production under Danish conditions of the two strains tested.

The prevalence of breast blisters was significantly higher in males birds of both strains. Breast blister prevalence could thus be reduced by using only female birds in organic production, but this will have other implications for the organic concept in terms of sustainability, if no other use for male birds can be found. The possibility to perch is assumed to have a positive welfare effect on the birds, and the design of perches needs to be evaluated in relation to perch use and breast blisters. These results is published by Nielsen, (2004)

## C.2 Fulfilment of deliverables and milestones

| <b>WP 1: Breed performance and welfare at farm level</b>                 | Time schedule according to application | Deviations, if any* |
|--|--|---------------------|
| <b>Deliverables</b>  |  |                     |
| D 1. Production performances, egg quality and health of four breed       | Running                                |                     |
| D 2. Feather pecking behaviour and integument of four breeds             | Running                                |                     |
| D 3. Individual range behaviour of four laying breeds                    | Running                                |                     |
| D 4. Final report of WP1   | June 2005                              | Oct 2006            |
| <b>Milestones</b>  |  |                     |
| Completed first egg production period on farms, All farms has completed. | Feb 2003                               |                     |
| Completed second egg production period on farms,                         | Feb 2004                               |                     |
| Completed third egg production period on farms,                          | Jun 2005                               |                     |
| Completed data analysis,   | Jun 2005                               | March 2006          |

| <b>WP2: Studies on disease incidence and the significance of diseases and interaction in organic free-range poultry</b>  | Time schedule according to application | Deviations, if any*                   |
|--|--|---------------------------------------|
| <b>Deliverables</b>  |  |                                       |
| <b>D 5.</b> Cross-sectional studies on causes on mortality in free-range chickens in Denmark.  | 2002                                   | Running until 2004                    |
| <b>D 6.</b> Longitudinal studies on the significance on diseases in free-range chickens in Denmark   | 2004                                   | Running until 2004                    |
| <b>D 7.</b> Experimental investigations on the influence of <i>Dermansysus gallinae</i> on sensitivity to selected diseases in free-range chickens in Denmark.     | 2004                                   | Depending on the outcome of D5 and D6 |
| <b>D 8.</b> Experimental investigations on the influence of <i>Dermansysus gallinae</i> on the persistence of selected diseases in free-range chickens in Denmark. | 2004                                   | Depending on the outcome of D5 and D6 |

|  |      |                                       |
|--|------|---------------------------------------|
| <b>D 9.</b> Investigations on haematological changes associated with dual infections with <i>Dermanyssus gallinae</i> and <i>Pasteurella multocida</i> / <i>E.coli</i> . | 2004 | Depending on the outcome of D5 and D6 |
| <b>D 10.</b> Investigations on the significance of <i>Capillaria</i> spp. On production parameters and the persistence of selected disease agents in free-range poultry  | 2004 |                                       |
| <b>D 11.</b> Assessment of immune status of multiple disease infected poultry  | 2004 |                                       |
| <b>D 12.</b> Investigations on complement killing activity of in-bred lines of chickens used for free-range poultry production   | 2004 |                                       |
| <b>D 13.</b> Final report  | 2004 | 2006                                  |

| <b>WP3: Genetics of feather pecking</b>   | Time schedule according to application | Deviations, if any* |
|---|--|---------------------|
| <b>Deliverables</b>   |  |                     |
| <b>D 14.</b> Genetic parameters of traits related to feather pecking (realised heritabilities, etc.)                                      | 2004                                   |                     |
| <b>D 15.</b> Phenotypic and genetic correlation between feather pecking and egg production, egg quality, feed conversion, body weight etc | 2004                                   | 2005                |
| <b>Milestones</b>   |  |                     |
| Completed recording of feather pecking behaviour in generation 4  | October 2000                           |                     |
| Completed selection and reproduction of gen. 4 and start of rearing of generation 5   | January 2001                           |                     |
| Completed recording of feather pecking behaviour in generation 5  | October 2001                           |                     |
| Completed selection and reproduction of gen. 5 and start of rearing of generation 6   | January 2002                           |                     |
| Completed recording of feather pecking behaviour in generation 6  | Aug 2003                               |                     |
| Plan to recording of test birds in cages and "Eco" cottage of generation 6  |  | Dec2003             |
| Completed calculation of genetic parameters   | Aug 2004                               |                     |
| Completed report and papers,  | June 2005                              |                     |

## **D. Description of deviations and subsequent adjustments of plans**

WP1 The prolongation of the project was due to the difficulties in getting agreements with farmers that had the right facilities to do comparisons of two breeds.

WP2 The project is running according to the plan and will be concluded with several publications under ways in 2004-2006. However, as *Dermanyssus gallinae* has not shown to be a major problem in the free-range flock included in WP2 (outcome of D5 and D6) the experiments will be changed to meet the overall objective of the work package, namely to further investigate the most important diseases in free-range poultry. The study therefore has been directed to *Pasteurella multocida* and *Erysipelotrix rhusiopathiae* or Blackhead infections. The original described deliverables will not be met directly. Publications are under way and will appear in 2006 and also constitute the major part of the Ph.D. thesis of Nicoline Maag Stockholm which has had a year of maternity leave during 2005 and that is the explanation for the delaying of the publication serie from this work package.

## E. Project publications and other products

### 1. Products from Organic Eprints archive

Boelling, Dr. Dorothe; Groen, Dr. Ab F.; Sørensen, Prof. Poul; Madsen, Dr. Per and Jensen, Dr. Just (2003) [Genetic Improvement of Livestock for Organic Farming Systems](#). *Livestock Production Science* 80. Online at [http://www.sciencedirect.com/doi:10.1016/S0301-6226\(02\)00323-8](http://www.sciencedirect.com/doi:10.1016/S0301-6226(02)00323-8)\*\*

Dahl, C.; Permin, A.; Christensen, J.P.; Bisgaard, M.; Muhairwa, A.P; Petersen, K.M.; Poulsen, J.S. and Jensen, A.L. (2002) [The effect of concurrent infections with \*Pasteurella multocida\* and \*Ascaridia galli\* on free range chickens](#). *Veterinary Microbiology* 86(4):pp. 313-324.\*\*

Kjaer, Dr. Jørgen B.; Sørensen, Prof. Poul and Su, Dr. Guosheng (2001) [Divergent selection on feather pecking behaviour in laying hens \(\*Gallus gallus domesticus\*\)](#). *Applied Behaviour Science* 71:pp. 229-239.\*

Nielsen, Birte L. (2004) [Breast blisters in groups of slow-growing broilers in relation to strain and the availability and use of perches](#). *British Poultry Science* 45(3):pp. 306-315.

Nielsen, Dr. Birte L. (2003) [The relationship between breast blisters and the availability and use of perches by organic broilers](#). Paper presented at 37th International Congress of the ISAE (International Society for Applied Ethology), Abano Terme, Italy, June 24-28 2003; Published in Ferrante, Valentina, Eds. *Proceedings of the 37th International Congress of the ISAE (International Society for*

*Applied Ethology*), page pp. 122-122. Fondazione Iniziative Zooprofilattiche e Zootechnie.

Schou, T.; Permin, A.; Roepstorff, A.; Sorensen, P. and Kjaer, J. (2003) [Comparative genetic resistance to \*Ascaridia galli\* infections of 4 different commercial layer-lines](#). *British Poultry Science* 44(2):pp. 182-185.\*\*

Su, Guosheng; Kjaer, Jørgen B. and Sørensen, Poul (2005) [VARIANCE COMPONENTS AND SELECTION FOR FEATHER PECKING BEHAVIOR IN LAYING HENS](#). *Poultry Science* 84(1):pp. 14-21.\*

**Not peer-reviewed**

**English**

Maag Eigaard, N.; Permin, A.; Christensen, J.P. and Bisgaard, M. (2003) [Mortality in organic free-range chickens and molecular characterization of the involved pathogens](#). Poster presented at XIII Congress of the World Veterinary Poultry Association, Denver, Colorado, July 19-23, 2003.

Sørensen, Poul (2001) [Breeding strategies in poultry for genetic adaptation to the organic environment](#). Paper presented at Breeding and feeding for animal health and welfare in organic livestock systems, Wageningen, Netherlands, 24-27 march 2001; Published in Hovi, Malla and Baars, Tom, Eds. *Breeding and feeding for animal health and welfare in organic livestock systems, Proceedings of the Fourth NAHWOA Workshop*, page pp. 51-62.\*

Su, Dr. Guosheng; Kjaer, Dr. Jørgen B. and Sørensen, Prof. Poul (2003) [Genetic improvement on feather pecking behaviour by selection is promising](#). Poster presented at 3rd European Poultry Genetic Symposium, Wageningen, Netherlands, 17-19 september 2003; Published in *Proceedings 3rd European Poultry Genetic Symposium*, page 1.\*

Su, Dr. Guosheng; Kjaer, Dr. Jørgen B. and Sørensen, Prof. Poul (2003) [Genetic improvement on feather pecking behaviour is effective](#). Poster presented at 3rd European Poultry Genetic Symposium, Wageningen University, Netherlands, 17-19 september 2003; Published in *Proceedings 3rd European Poultry Genetic Symposium*, page 1.\*

## Dansk - Danish

Nielsen, Birte L. (2004) [Siddepinde og brystblærer hos slagtekyllinger](#) [Perches and breast blisters in broilers]. In *Oekologisk Jordbrug*, 28. May, No 314, page 4.

Nielsen, Birte L. (2000) [Svært at finde den bedste slagtekylling](#). In *Økologisk Jordbrug*, 25. August, page 16.

Permin, A.; Ambrosen, T.; Maag Eigaard, N.; Folden Fensburg, M.; Bojesen, M.; Christensen, J.P. and Bisgaard, M. (2002) [Sygdomme og velfærd](#) [Diseases and welfare]. In *Dansk Veterinær tidsskrift*, No 6, page pp. 12-16.\*

## 2 Other products (oral presentations, public meetings, field days, etc.)

### Written reports not in Organic Eprints archive

Sørensen, P., 2001. Status og perspektiver for forskning og udvikling af økologisk ægproduktion. FØJO-rapport nr 11, 7-12.\*

Sørensen, P. 2001. Den faglige baggrund: Økohøns kræver eget avlsarbejde *Landsbladet 17. august 2001\**

Sørensen, P. 2001 Avl for høns der er tilpasset en økologisk ægproduktion *Dansk Erhvervsfjerkræ 9:303-305\*\**

Anders Permin, Nicoline Maag Eigaard, Mimi Folden Flensburg, Miki Bojesen, Jens Peter Christensen, Thorkil Ambrosen og Magne Bisgaard. Sygdom og velfærd i økologiske konsumægsbesætninger. *Dansk Veterinærtidsskrift* 2002, 85,6, 15/3.\*\*

Sørensen, P. og Kjaer, J.B., 2003. Ny fjerkræforskning – godt på vej. *Forskningsnytt om økologisk landbrug i Norden*, 5: 16-18. \*

Sørensen, P., Danell, B., Brenøe, U. & Tuiskula-Haavisto, M., 2004. A review of Poultry Breeding stock in the Nordic Countries. NGH report, 25 pp.\*\*

Pryce, J.E., Connington, J., Sørensen, P., Kelly, H.R.C. & Rydhmer, L. 2004. Breeding Strategies for Organic Livestock. In: Vaarst, M. et al (eds) *Animal Health and Welfare in Organic Agriculture*, 357-388. ISBN 085199 688X. \*\*

Su. G., Kjaer, J.B. & Sørensen, P. 2006 Divergent selection on feather pecking behavior in laying hens has caused differences between lines in egg production, egg quality and feed efficiency. *Poultry Science* 85: Reviewed and planned to appear in the February issue.\*

Sørensen, P. 2006. Ingen afstamning udskiller sig tydeligt som den bedste æglægger. FØJO-nyt

expected to appear in January 2006. \*

Presentations on congresses, seminar

Kjaer, J.B. (2002). Recording of feather pecking and selection against feather pecking. Archiv für Geflügelkunde, special issue september, 11th European Poultry Congress, abstracts, 6-10 September, 2002, Bremen. Ed. European Federation Worlds Poultry Science Association, 31 (invited paper).\*\*

Hegelund, L., Kjaer, J.B., Kristensen, I.S. and Soerensen, J.T. (2002). Use of the outdoor area by hens in commercial organic egg production systems. Effects of climatic factors and cover. Archiv für Geflügelkunde, special issue september, 11th European Poultry Congress, abstracts, 6-10 September, 2002, Bremen. Ed. European Federation Worlds Poultry Science \*\*

Eigaard, N.M. Mortality in Organic Free-Range Chickens and Molecular Characterization of the Involved Pathogens. The Nordic Advisory- and Veterinary Seminar. Denmark. 21-23 November 2002\*

Permin, A. Sygdomsproblemer i den økologiske konsumægproduktion med vægt på parasitære sygdomme. Oplæg ved Nordisk Konsulent -og Veterinærmøde. Skeikampen 18-20 november 2001\*

Permin, A. Dual infections with *Pasteurella multocida* and *Ascaridia galli* infections in chickens. The Nordic Advisory- and Veterinary Seminar. Denmark. 21-23 November 2002.\*\*

Nielsen, B.L. (2003). The relationship between breast blisters and the availability and use of perches by organic broilers. *Proceedings of the 37<sup>th</sup> International Congress of the International Society of Applied Ethology*, 24-28 June, Abano Terme, Italy, p. 122.\*

Eigaard, N.M. WPSA – Seminar 2003. Sygdomsproblemer hos økologiske høner. April 21 2003\*

Jessen, Louise (2004) Stress, aktivitet og fjerpilning som reaktion på lysintensitet og dagslængde hos tre genetiske linier af Hvid Italiener (*Gallus gallus domesticus*). Master thesis, Syddansk Univrsitet. \*\*

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Kjaer, J.B. and de Jong, I., 2005. Substrate preferences in chickens selected for and against feather pecking behaviour. Proc. 7th European Symposium on Poultry Welfare, 15-19 June, Lublin, Poland. Polish Academy of Sciences 23(Supp 1):299-300. \*

## Seminar om Adfærd og sygdomme i konsumægsproduktionen

Producent seminar blev afholdt tirsdag den 10. maj kl. 10–15, 2005 på Vejlbj Landbrugsskole for 12 producenter der havde været forsøgsværter.

Seminaret omhandlede sygdomsproblemer og fjerpilning i konsumæghønseshold.

Der blev givet overblik over opnåede resultater fra deltagende besætninger under Nicoline's projekt (WP2), samt studie om salmonella i samspil med den store hønsecorm (*Ascaridia galli*). Oplæg blev givet af Anders Permin, Jens Peter Christensen og Nicoline (alle fjerkræ-dyrlæger på Den Kgl. Veterinær og Landbohøjskole). Dyrlæge Lis Olesen, Intervet gav et indlæg omkring TRT/AP vaccination (virusinfektion, der i øjeblikket ses hos æglæggere), samt vaccination mod Newcastle disease, og Poul Sørensen (Danmarks JordbrugsForskning, Forskningsprofessor indenfor fagområdet fjerkræavl) gav et indlæg om forskellige hønseafstammingers egnethed til den fritgående konsumægs-produktionsform herunder især fjerpilning, som den har været observeret i nogle udvalgte besætninger. \*

\* 25-75% financed by DARCOF

\*\* 5-25% financed by DARCOF

## F. Scientific education

Nicoline Maag Eigaard was registered as a PhD student the 1<sup>st</sup> of December 2002. The Royal Veterinary and Agricultural University has agreed to finance the last year of the PhD study.

Ph.D.-courses:

- SOAR, Summerschool 2004: Is Organic Farming the Key to Sustainability?, 2004, 4 ECTS
- NOVA, Nordic postgraduate course in Veterinary Epidemiology Part 1, 2003, 5 ECTS
- NOVA, Nordic postgraduate course in Veterinary Epidemiology Part 2, 2004, 4 ECTS
- The Royal Veterinary and Agricultural University, Statistics for Veterinarians, 2003, 9 ECTS
- The Royal Veterinary and Agricultural University, Immunologi, 2002, 24 ECTS
- The Royal Veterinary and Agricultural University, Veterinary Immununo-diagnostic Methods, 2002, 6 ECTS

Ph.D.-courses which will be finish in 2005:

- The Royal Veterinary and Agricultural University, Poultry Diseases, (practical part and theoretical finished – a examination paper need to be handed in to pass the final part of the course, 11 ECTS

Furthermore Nicoline is teaching the veterinary students in poultry diseases as a part of the scientific education.

Louise Jessen was registered as a master student and defended her master thesis June 25<sup>th</sup>, 2004, from the University of Southern Denmark, Odense. Her tutor at the University was Ass. Professor Ole Naesbye Larsen.

## G. National and international cooperation

**The interacting context with other projects** on organic poultry production in Denmark was the topic of a 24 h workshop held in November 2001. In total it had 15 participants of whom 8 came from DIAS, 3 from KVL, 3 from the Advisory Service organizations in Denmark and one from Danish Animal Welfare Society. Three of them had started a PhD study within the area of organic poultry production. A similar symposium is planned to take place at the end of the project to learn what we have experienced.

**Research cooperation** is established with the project "Improvement of Nutrition and Health..." in relation to Task 16, as half of the replicates is supported with roughage. Influence of using roughage on health and intestine environments is investigated and also a possible interaction with genotypes is investigated.

The Project leader (PS) is **member of the Steering group** for the project "The Outdoor areas for poultry) and had participated in meetings and workshop.

In relation to the welfare in organic egg production in Denmark, the Ministry of Food, Agriculture and Fisheries, called experts to participate in **a working group to formulate a revised set of control measures, including animal welfare indicators**. These new control measures are to be included in the official control of organic egg production. Furthermore, we have held a 2-day training course on Foulum, including practical lessons on two commercial farms. All official controllants of licensed organic egg production units (approx. 12 persons) have participated. **Two persons from the project participated (A. Permin and J.B Kjær)**. The new control scheme has now been tested on most (>80%) of all commercial organic egg production farms in Denmark. Results from test are being analysed now, also under participation of project participants.

**A EU-proposal entitled** "A breeding programme for: Healthy and well-adapted laying hens in organic and free-range systems - for a rural and animal friendly egg production in Europe" was worked out during 2000 in a cwork with scientist from Germany, Austria, Switzerland, Denmark and Netherland, with a German co -ordinator and PS as the danish participant. The proposal failed to pass the evaluation of the EEC. In a next step it was tried to establish an expression of interest for "Organic Farm Animal Breeding" for the FP6 program as a Network of Excellence. Also this failed to be accepted by the EEC. A third initiative is started and had its first meeting in October 2003 in which discussion on the concept of what actually "organic breeding" do have of implication for the various species in order to try to get and understanding of the concept. Also it was agreed that an "Animal Breeding Network with an organic perspective" should be created consisting of 6-8 European Institutes/organisations similar to an European Network already established for organic plant breeding. The first meeting in such a Network is planned to take place at the end of 2004, and with representatives from Department of Animal Breeding and Genetics at DIAS.

**Nordic Gene Bank Animal** has established a working group with the purpose to describe existing breeding stock of hens within the Baltic See that is suitable for free range egg production, organic egg production is considered to belong to this group. PS is chairman of the group and they had a report finished in October 2004.

## H. Critical reflection on the project

[Her gives der en kritisk refleksion over projektets planer, forløb og resultater. Det kan rumme refleksioner over det videnskabelige håndværk med hensyn til fx metodevalg, prøvbarhed og udførelse; over eventuelle ændringer i relevans som følge af ændringer i omverdenen eller som følge af den læring der er sket i projektet; samt over aspekter af forskningsudvikling, især i relation til FØJOs mål om at udvikle tværgående og relevant forskning (og hvad der evt. kunne gøres bedre). Her diskuteres endvidere væsentlige justeringer af projektet som følge af afvigelser fra planen (fra C.2 og D) og andre væsentlige ændringer.]

## 8. Budget

### A. Account for any change in budgets

### B. Budget for the whole project (1.000 DKK)

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 100,0           | 81,5                    | 11               | 2                | 100,5 |
| Scientific personnel | 82,5            | 64,0                    | 11               | 2                | 76,0  |
| Technical personnel  | 17,5            | 24,5                    |                  |                  | 24,5  |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total     |
|---|-----------------|-------------------------|------------------|------------------|-----------|
| Salaries                                | 2887            | 2588                    | 323              | 81               | 2992      |
| Scientific personnel                    | 2311            | 1974                    | 323              | 81               | 2378      |
| Technical personnel                     | 576             | 614                     |                  |                  | 614       |
| Other operational costs                 | 964             | 784                     | 73               | 18               | 875       |
| Equipment                               |                 |                         |                  |                  |           |
| Others (please specify)                 | 890<br>99       | 774<br>99               | 53               | 61               | 888<br>99 |
| Direct costs                            | 4840            | 4245                    | 449              | 149              | 4854      |
| Indirect costs<br>(20% of direct costs) | 790             | 677                     | 80               | 19               | 776       |
| Total                                   | 5630            | 4922                    | 529              | 179              | 5630      |

**Comments:**

## 9. Signatures and stamps

| Name            | Institute | Date | Signature |
|-----------------|-----------|------|-----------|
| Head of project |           |      |           |

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 Appendix I. Detailed budget

**A. Budget for each participating institute (1.000 DKr)**

Name of Institute: Danmarks JordbrugsForskning

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 58,0            | 52,5                    | 4,0              | 2,0              | 58,5  |
| Scientific personnel | 45,5            | 35,0                    | 4,0              | 2,0              | 41,0  |
| Technical personnel  | 12,5            | 17,5                    |                  |                  | 17,5  |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total     |
|---|-----------------|-------------------------|------------------|------------------|-----------|
| Salaries                                | 1911            | 1745                    | 140              | 81               | 1966      |
| Scientific personnel                    | 1485            | 1319                    | 140              | 81               | 1540      |
| Technical personnel                     | 426             | 426                     |                  |                  | 426       |
| Other operational costs                 | 615             | 520                     | 38               | 18               | 566       |
| Equipment                               |                 |                         |                  |                  |           |
| Others (please specify)                 | 890<br>99       | 774<br>99               | 53               | 61               | 888<br>99 |
| Direct costs                            | 3515            | 3138                    | 231              | 160              | 3529      |
| Indirect costs<br>(20% of direct costs) | 525             | 455                     | 37               | 19               | 511       |
| Total                                   | 4040            | 3593                    | 268              | 179              | 4040      |

**Comments:**

**A. Budget for each participating institute (1.000 DKr)**

Name of Institute: Den Kgl. Veterinær og Landbohøjskole

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 42              | 35                      | 7                |                  | 42    |
| Scientific personnel | 37              | 28                      | 7                |                  | 35    |
| Technical personnel  | 5               | 7                       |                  |                  | 7     |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|---|-----------------|-------------------------|------------------|------------------|-------|
| Salaries                                | 975             | 843                     | 183              |                  | 1026  |
| Scientific personnel                    | 825             | 655                     | 183              |                  | 838   |
| Technical personnel                     | 150             | 188                     |                  |                  | 188   |
| Other operational costs                 | 350             | 264                     | 35               |                  | 299   |
| Equipment                               |                 |                         |                  |                  |       |
| Others (please specify)                 |                 |                         |                  |                  |       |
| Direct costs                            | 1325            | 1107                    | 218              |                  | 1325  |
| Indirect costs<br>(20% of direct costs) | 265             | 222                     | 43               |                  | 265   |
| Total                                   | 1590            | 1329                    | 261              |                  | 1590  |

**Comments:**

**B. Budget for each participating department (1.000 DKK)**

Name of Institute and department: DJF og Afd for Husdyravl og Genetik  
Workpackage 1+3+5+6

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 16,5            | 12,0                    | 1,0              | 2,0              | 15,0  |
| Scientific personnel | 16,5            | 12,0                    | 1,0              | 2,0              | 15,0  |
| Technical personnel  |                 |                         |                  |                  |       |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total     |
|---|-----------------|-------------------------|------------------|------------------|-----------|
| Salaries                                | 554             | 481                     | 32               | 81               | 594       |
| Scientific personnel                    | 554             | 481                     | 32               | 81               | 594       |
| Technical personnel                     |                 |                         |                  |                  |           |
| Other operational costs                 | 120             | 105                     | 8                | 18               | 131       |
| Equipment                               |                 |                         |                  |                  |           |
| Others (please specify)                 | 890<br>99       | 774<br>99               | 53               | 61               | 888<br>99 |
| Direct costs                            | 1663            | 1459                    | 93               | 160              | 1712      |
| Indirect costs<br>(20% of direct costs) | 147             | 119                     | 9                | 19               | 147       |
| Total                                   | 1860            | 1578                    | 102              | 179              | 1859      |

**Comments: Jørgen Kjær blev 1. Januar 2005 overført administrativt fra Afd for Husdyrsundhed og velfærd, hvorfor budget for 2005 er forøget med 60.000**

Name of Institute and department: DJF, Afd for Husdyrsundhed og velfærd  
Workpackage 1+3

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 32,5            | 27,5                    | 3,0              |                  | 30,5  |
| Scientific personnel | 15,0            | 14,0                    | 3,0              |                  | 17,0  |
| Technical personnel  | 17,5            | 13,5                    |                  |                  | 13,5  |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|---|-----------------|-------------------------|------------------|------------------|-------|
| Salaries                                | 950             | 842                     | 108              |                  | 950   |
| Scientific personnel                    | 612             | 504                     | 108              |                  | 612   |
| Technical personnel                     | 338             | 338                     |                  |                  | 338   |
| Other operational costs                 | 366             | 287                     | 30               |                  | 317   |
| Equipment                               |                 |                         |                  |                  |       |
| Others (please specify)                 |                 |                         |                  |                  |       |
| Direct costs                            | 1316            | 1129                    | 138              |                  | 1267  |
| Indirect costs<br>(20% of direct costs) | 264             | 226                     | 28               |                  | 254   |
| Total                                   | 1580            | 1355                    | 166              |                  | 1521  |

**Comments:**

**Jørgen Kjær blev 1. Januar 2005 overført administrativt til Afd for Husdyravl og Genetik, hvorfor budget for 2005 er reduceret til 0**

Name of Institute and department: DJF, Afd for Husdyrsundhed og Velfærd

Work package 4: Slagtekyllinger

| Year:                | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|----------------------|-----------------|-------------------------|------------------|------------------|-------|
| Man-months           | 13,0            | 13,0                    |                  |                  | 13,0  |
| Scientific personnel | 9,0             | 9,0                     |                  |                  | 9,0   |
| Technical personnel  | 4,0             | 4,0                     |                  |                  | 4,0   |

| Year:                                   | Original budget | Consumption before 2004 | Consumption 2004 | Consumption 2005 | Total |
|---|-----------------|-------------------------|------------------|------------------|-------|
| Salaries                                | 408             | 422                     |                  |                  | 422   |
| Scientific personnel                    | 320             | 334                     |                  |                  | 334   |
| Technical personnel                     | 88              | 88                      |                  |                  | 88    |
| Other operational costs                 | 128             | 128                     |                  |                  | 128   |
| Equipment                               |                 |                         |                  |                  |       |
| Others (please specify)                 |                 |                         |                  |                  |       |
| Direct costs                            | 536             | 550                     |                  |                  | 550   |
| Indirect costs<br>(20% of direct costs) | 124             | 110                     |                  |                  | 110   |
| Total                                   | 660             | 660                     |                  |                  | 660   |

**Comments:**

**C. Budget for co-financing from each participating institute (1.000 DKK)**

Name of Institute:

| <b>Year:</b>         | <b>Original budget</b> | <b>Consumption before 2004</b> | <b>Consumption 2004</b> | <b>Consumption 2005</b> | <b>Total</b> |
|----------------------|------------------------|--------------------------------|-------------------------|-------------------------|--------------|
| Man-months           |                        |                                |                         |                         |              |
| Scientific personnel |                        |                                |                         |                         |              |
| Technical personnel  |                        |                                |                         |                         |              |

| <b>Year:</b>                            | <b>Original budget</b> | <b>Consumption before 2004</b> | <b>Consumption 2004</b> | <b>Consumption 2005</b> | <b>Total</b> |
|---|------------------------|--------------------------------|-------------------------|-------------------------|--------------|
| Salaries                                |                        |                                |                         |                         |              |
| Scientific personnel                    |                        |                                |                         |                         |              |
| Technical personnel                     |                        |                                |                         |                         |              |
| Other operational costs                 |                        |                                |                         |                         |              |
| Equipment                               |                        |                                |                         |                         |              |
| Others (please specify)                 |                        |                                |                         |                         |              |
| Direct costs                            |                        |                                |                         |                         |              |
| Indirect costs<br>(20% of direct costs) |                        |                                |                         |                         |              |
| <b>Total</b>                            |                        |                                |                         |                         |              |

**Comments:**