WP 3

Impact of different types of local concentrates on productivity, health, behaviour and welfare of pigs and poultry in different production phases

Report on D 3.4 Workshop for results' interpretation (TI, RE, month 24)

ICOPP project meeting
AU-Foulum, Denmark
10-11th June 2014
Parallel WP 3 sessions for pigs & poultry, 10th June 2014, 13:45 - 15:15

WP 3.2: The effects of grass pea (Lathyrus sativus) and sainfoin (Onobrychis viciifolia) in 100 % organic diets for weaned piglets

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(i) Current status of the project

Experimental work completed

Sainfoin seeds:
137 weaned piglets, 4 week rearing phase
Diets: control, 10 % sainf.s., 10% & 16 % dehulled sainf.s.

Grasspea seeds:
144 weaned piglets, 4 week rearing phase
Diets: control, 20 % raw grassp.s., 20 % & 30 % toasted grassp.s.

(ii) Conclusions

Sainfoin seeds are of high nutritional value, particularly if dehulled (similar to soybean cake).

Sainfoin seeds can partially substitute commonly used protein sources.

Nutrient content of grasspea seeds is slightly higher than that of Faba beans, but caution must be taken due to ANF content (particularly ODAP).

Grasspea seeds can partially substitute commonly used protein if subjected to appropriate heat treatment.

(iii) Recommendations

Sainfoin and grasspea seeds possess specific advantages under difficult growing conditions (marginal, dry or wet soil conditions).

This may (partially) compensate their relatively low yields.

The nutritional value of sainfoin seeds is substantially higher than that of grasspea seeds, which contain potentially toxic constituents.

Processing technologies significantly increase the feeding value of sainfoin (dehulling) and grasspea seeds (thermal treatment).

If properly processed, both sainfoin seeds and grasspea seeds can be used to substitute for scarce protein sources (particularly soybean expeller) without affecting growth performance and health of weaned piglets.

WP 3.4: A study on six feeding strategies of 100% organic origin for piglets with respect to performance, health status, losses and economy in organic agriculture

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(i) Current status of the project

The feeding trials will be finished in July 2014 (24 suitable litters per feeding strategy)

Data recording: regular

Haptoglobin analyses: still to be done

Statistics: still to be done

Final report: still to be done

(ii) Conclusions (based on the currently available results/perceptions)

High External Input diet (HEI): best performance

Medium & Low External Input diet: lower but good performance

Health status: weak piglets/problematical litters benefit from HEI

Losses: obviously no differences

Roughage source: without significance

Economics: Low External Input strategy = low-priced system

(iii) Preliminary recommendations (based on the currently available conclusions)

Low External Input diets can be recommended!

Preconditions:

- No obvious herd health problems
- Outstanding management conditions

It is a solution for farmers with “pig sense”!

WP 3.5: Inclusion of mussel meal in diets to growing/finishing pigs – influence on performance and carcass quality

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(i) Current status of the project

Experimental work completed. 32 YH and 32 YD pigs fed either a traditional feed or a feed with 5% inclusion of mussel meal, from 37 kg live weight to slaughter at 107 kg live weight.

Data collected and analysed.

Input from digestibility trial missing.

Abstract for EAAP August 2014 accepted.

Final report still to be done.

(ii) Conclusions (based on the currently available results/perceptions)

Mussel meal can replace common protein sources in feed for growing/finishing pigs with maintained production results in terms of growth, feed efficiency and carcass quality.

Currently no information is available whether the sensory quality of meat is affected or not.

(iii) Preliminary recommendations (based on the currently available conclusions)

Mussel meal can substitute fish meal in diets for growing pigs provided that the price of mussel meal is competitive and that the hygienic quality is sufficient. Inclusion of mussel meal should not exceed the levels recommended for fish meal.

WP 3.6: Feeding sows in multiple phases with organically produced feedstuffs during gestation and lactation

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(i) Current status of the project

Objective: To study the effects of phase feeding of pregnant lactating sows on body condition and production on 100% organic feeding. During gestation, phase feeding was carried out from the last third of pregnancy (week 11) and during lactation, from the fourth week to weaning.

Experimental work completed:

1. Preliminary trial, feed intake of 100% organic diet during lactation
- 12 sows, backfat thickness of the sows, feed intake and liveweight of sows and piglets
- Work completed and published in 2013 (NJF Seminar 461, Bredsten, Denmark)
2. Feeding trial, phase feeding
- 84 sows (of them 28 were gilts), number of farrowings was 98.
- Group 1 (control, no phase feeding)
  - gestation: grain-pea based diet
  - lactation: grain-pea based lactation mixture + organic protein concentrate
- Group 2 (phase feeding 1)
  - gestation: grain-pea based diet, from 11th week of gestation: + grain-pea based lactation mixture + organic protein concentrate
  - lactation: grain-pea based lactation mixture + organic protein concentrate, from the 4th week: + rapeseed expeller
- Group 3 (phase feeding 2)
  - gestation: grain-faba bean based diet, from 11th week of gestation: + grain-faba bean based lactation mixture + organic protein concentrate
  - lactation: grain- faba bean based lactation mixture + organic protein concentrate, from the 4th week: + rapeseed expeller

Statistical calculations and reporting: to be completed on September 2014 (Month 36)

(ii) Conclusions (based on the currently available results/perceptions)

Preliminary trial: The sows lost weight during the lactation period on average 22.8 kg and back fat thickness 7 mm despite the well increased voluntary feed intake. High feed intake resulted in good milk production and piglet weight gain but the sows also mobilized their own tissues for milk production. Formulation of 100% organic lactation diet with sufficient nutrient density for high producing sows is challenging.

(iii) Preliminary recommendations (based on the currently available conclusions)

Energy and protein density of the 100 % organic lactation diet should be increased as early as from 3rd week of lactation onwards in order to minimize the weight loss of the sow during the at least 40 day lactation period. Feed amino acid balance from 22nd day of lactation should match the amount of live weight lost during the first 21 days of lactation. This should be supported by providing the piglets' feed attractive enough to ensure their high creep intake during the late lactation period.

WP 3.7: Mussel shells as enrichment in floor-housed laying hens

H. Wall, R. Tauson, SLU, Kungsängen Research Centre (Avian Div.), Uppsala, Sweden

(i) Current status of the project

Experiment completed, data analysed, no results published yet.

(ii) Conclusions (based on the currently available results/perceptions)

Crushed mussel shells (particle size 10-20 mm) supplied in the litter on every day basis to layers affected neither birds' feather cover, nor other welfare parameters or production performance.

(iii) Preliminary recommendations (based on the currently available conclusions)

Access to crushed mussel shells in the litter to floor housed layers does not affect feather pecking. The mussel shells cannot replace part of the calcium provided in the feed, at least not when provided in a particle size of 10-20 mm.

WP 3.8: Effect of organic feed ingredients as protein source on performance, behaviour and health of laying hens

Marinus van Krimpen (Wageningen UR Livestock Research, The Netherlands)

(i) Current status of the project

We planned to perform a field trial to compare 95% and 100% organic diets in laying hens. We had several concerns, e.g. to find an appropriate farm and to find the desired protein rich ingredients of animal origin. Finally, we decided to switch from a field study to a desk study. Now we wrote a draft paper, in which the options to fulfil the 100% requirements of concentrates are described. Some other Icopp partners will be asked to add information related to protein supply from the outdoor area as well as from roughages.

(ii) Conclusions (based on the currently available results/perceptions)

Within the ingredients of plant origin, sunflower seed expeller is a representative of ingredients with a relatively high dig. Met content, which is also commonly available. Plant processing techniques might be helpful to concentrate the protein and dig. Met content of ingredients. Canola protein concentrate is the result of such technique. Applying the dry fractionation technique on legumes and cereals, which is a rather simple technique, might result in protein concentrates with crude protein contents of at least 50%. A further development of simple separation techniques, which separate the hulls from the other plant fractions, might be helpful to increase the dig. Met content. Energy dilution of the diet, concomitant with a proportional reduction in other nutrients, e.g. dig. Met, is an option as well to fulfil the requirement of 100% organic diets. It is concluded that several options are available to fulfil the requirement of 100% ingredients of organic origin in organic laying hen diets.

(iii) Preliminary recommendations (based on the currently available conclusions)

- Methionine supply is the main bottleneck
    - Select ingredients with a high dig. Met : CP ratio
    - Process ingredients to further concentrate the Met content
    - Reduce the energy content of the diet, while maintaining the energy : Met ratio, e.g. by feeding roughages or herbs
    - Adjust the dig. Met content to the feed intake of the hens
    - Determine the CP and AA digestibility of organic ingredients

WP 3.9: A study on the impact of three 100% organic feeds on broiler performance and welfare

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(i) Current status of the project

Experimental work completed: July-Aug 2012 and Jan-Feb 2013

Three diets tested were:

1) standard 100% organic poultry feed (with soya) currently available in the UK (control)

2) locally-sourced 100% organic poultry feed (with sweet lupins)

3) locally sourced 100% organic poultry feed incorporating algae (*Spirulina* spp.)

Hubbard JA 757 broilers from day 43 to day 64

Eight replicates of each diet and 10-11 birds per replicate in summer trial; and four replicates and 20 birds per replicate in winter trial.

Data recorded: weight gain, final weight, feed conversion ratio (winter only), breast feather coverage and hock lesions

(ii) Conclusions (based on the currently available results/perceptions)

Summer trial – no significant difference in total weight gain between the three diets. No significant differences in welfare parameters.

Winter trial – significant difference in total weight gain with the local feed diet resulting in a lower weight gain than the local feed with algae diet. Significantly higher FCR for the local feed compared to the control diet. No significant differences in welfare parameters.

(iii) Preliminary recommendations (based on the currently available conclusions)

Local feed with algae performed well compared with soya control, even in winter

Preliminary trials only – need more research, carcass quality etc.

Current limitations of using algae due to availability, economic feasibility and certification issues

But increasing interest in use of algae for bioenergy so much development in sector

Best potential is to target algae production for specific AA to top up basic crude protein provision from other local sources

Overall conclusions

The overall discussion of the projects resulted in the following conclusions concerning:

Pigs

From a biological point of view, 100% organic feeding (with focus on protein/essential amino acid supply) seems to be feasible.

It seems to be questionable whether the quantities and qualities of the required feeding stuffs are available at present and in the near future if only regional till EC-wide origin is aimed. (These views are also based on the previous of wp 1 and wp 2 discussions.)

100% organic feeding will stress economy.

Poultry

Regarding the issue of supplying organic concentrates main findings were:

- Protein from organically produced Spirulina algae can fully replace protein from traditional organic sources in broiler diets.
- Refining of ingredients of plant origin enriching the relative content of Methionine seems to be a useful way to supply relevant protein sources for poultry, eg for sunflower seed expeller.
- Insects meal *(Hermetia illucens)* up to 12 % in the diet can replace soybean cake without any difference in egg production, feed conversion, health and taste of eggs.
- Crushed mussel shells (particle size 10-20 mm) supplied in the litter on every day basis to layers affected neither birds' feather cover, nor other welfare parameters or production performance. Crushed mussel shells cannot fully replace dietary calcium as calcium source without impairing bone health and egg shell strength.