

A10. Keywords

Max. 5 keywords to describe the project activity.

High-value, marketing, product-quality, free-range-livestock, diversified meat

A11. Short project description/summary on objectives, activities, and expected results, both in Danish and English language (max 1500 characters, incl. spaces for both languages) With the aim to increase the production and market share of organic meat (pork, poultry and young beef), an integrated research and development effort will take place along the food chain (primary production, product development and **marketing**). The hypothesis is that this product segment is presently underdeveloped due to incompatibility between production costs/consumer prices and the experienced quality of the products, and that this incompatibility primarily should be overcome by adding quality in a broad sense to the organic meat products. Among the immaterial qualities are that the animals are healthy as well as robust, are **free-ranged**, and is more integrated in the land use (relying to a large extent on on-farm resources) than actually present. In the project these quali-

ties are investigated, while at the same time focusing on appearance, new cuts, taste and technological quality of the final product, including consumer perceptions and preferences. Specifically we will investigate how much foraging can contribute to the nutritional needs for pigs and poultry and its interaction with genotype, age at slaughter and **product quality**, how the quality of the sward and genotype affect product quality in young intact bulls, how the free range impact upon animal robustness, how **marketing** strategies can be formed complying with consumer perceptions, and how such production strategies support a profitable **high-value** production along with environmental benefits. This is expected to stimulate to more **diversified meat** products, a higher total organic meat production and consequently a higher organic share of total meat consumption.

Markedsdrevet, højværdi økologisk kødproduktion med robuste dyr

Mens der er et stigende marked for økologiske produkter generelt, er den økologiske kødproduktion kun svagt udviklet. Det gælder svin, fjerkræ og ungkvæg. Blandt årsagerne er, at produkter heraf kræver en væsentlig større merpris i forhold til konventionelle produkter sammenlignet med andre økologiske varer, uden at produktets fysiske og sensoriske kvalitet isoleret set berettiger hertil. På denne baggrund er den overordnede arbejdshypotese i projektet, at en udviklingsvej for den økologiske kødproduktion er at producere produkter, der såvel i fysisk/sensorisk kvalitet som i immateriel kvalitet adskiller sig markant fra konventionelle produkter, således at en væsentlig merpris kan retfærdiggøres. Nogle væsentlige immaterielle kvaliteter er at dyrene går på friland, at fodringen baseres på lokale ressourcer og at dyrenes sundhed og velfærd understøttes. I projektet undersøges disse kvaliteter, mens der samtidig fokuseres på udseende, udskæringer, smag, og teknologiske kvalitet af de færdige produkter, inklusiv forbruger præferencer. Specifikt vil vi undersøge hvor meget fouragering af frilandsafgrøder kan bidrage til næringsstofforsyningen hos svin og fjerkræ, og hvordan dette påvirkes af genotype og slagtealder samt hvordan produktkvaliteten påvirkes; undersøge hvordan græstype og genotype påvirker vækst og produktkvalitet hos unge tyre og kvier; undersøge hvordan produktionssystemerne påvirker dyrenes robusthed udtrykt ved immun kompetencer; samt undersøge hvordan der kan udvikles markedsførings strategier for disse produkter i overensstemmelse med forbrugeropfattelse og præferencer. Sammenfattende forventes dette at stimulere til mere diversificerede kødprodukter og en højere markedsandel af økologisk kød.

A12. Project description

(All parts of A12 must be filled out. Use "Garamond" as font, and font size 12, single spaced)

A12.1 The project objectives (2-3 lines).

The objective is to investigate and demonstrate how the organic meat production (pork, poultry and young beef), which presently holds a very small share compared to other foods, can achieve its fair share of the organic food market by an integrated effort in primary production systems, product development and marketing with the aim to distinguish itself from the conventional products in terms of immaterial quality and history as well as material product quality.

A12.2 The background and idea (hypotheses) incl. the national and international "state of art" and incl. references relevant for the section (max. ¼ page).

While the organic food market has a high share for many basic foods, the organic meat production is much less developed. Thus, organic chicken, pork and young beef have a market share of 1.0 % or less of total consumption of these meats (Økologisk Landsforening, 2009). One of the reasons is that the high costs of organic meat production necessitates an even higher premium price than for most other organic food products, which apparently is not justified by the product's physical, sensory and(or) immaterial quality. This is a major drawback for the organic sector in sev-

eral ways. The organic meat production in total is smaller than its 'justified' share and the lack of an organic production systems with young beef animals constitutes an ethical concern, since the major part of the calves born in the otherwise successful organic dairy production is not reared as organic. The development path explored in this project is to produce meat products, that are markedly differentiated from conventional products in terms of both physical/sensory and immaterial qualities in such a way that the customers find a substantial premium price justified. This project is thus focusing on the development of an 'alternative innovative strategy' for organic meat production of chicken, pigs and cattle (Alrøe and Halberg 2008).

In the primary production for all three meat products it is a drawback that the typical production is based on concentrates/cereals which is problematic from an economic point of view as well as a resource perspective. The hypothesis in this project is that foraging – taking into account interaction with genotype, age at slaughter and product quality – can contribute significantly to the nutritional needs for pigs and poultry (Horsted and Hermansen, 2007), while utilizing the animal's innate behavioral needs and thus support animal welfare at the same time. It is also hypothesized that such systems support the robustness of the animals, since the innate immunity/overall immune response at least for pigs seems improved in free-range systems/stimuli-rich systems compared to when kept in barren environments (Rudien et al., 2007; Sutherland et al., 2006). For young cattle, grazing can constitute a considerable part of the diet, but concerns exist regarding the quality of the beef produced on clover-grass and herbs (Vestergaard et al., 2000). However, the growth rate, carcass value (Therkildsen et al., 1998) and eating quality (Vestergaard et al., 2000) of Danish Holstein bull calves and young bulls is not high enough to be either economically attractive or marketable as high quality beef. As a way to improve production efficiency, which is a prerequisite for increased overall production, the hypothesis is that use of crossbred (beef x dairy) calves of both sexes in combination with strategic supplementation of small amounts of concentrate and improved sward may result in superior beef quality while maintaining a high growth rate.

At the consumption side the suggested production strategy needs to be considered as a high value organic meat product that does not compete with the average meat products, but with brands in the premium end of the market. Companies in the Danish meat sector own considerably fewer brands and introduce fewer new brands than the food sector on average (Baker et al., 2006). This suggests that the premium market for meat products is currently not well developed, and that there are unexploited opportunities for premium brands, although it cannot be excluded that there are fundamental obstacles that makes branding more difficult in this than in other (food) areas. The hypothesis is that it is possible - through the very different rearing conditions with emphasis on coherence between direct material and immaterial product quality as defined by exploring consumer preferences and perceptions - to differentiate the products from mainstream products and thus create the basis for high-price premium products. In this way some major barriers for organic meat production may be turned into a market potential.

(For references see A15)

A12.3 The projects contribution to solving important challenges for the organic food, agriculture and aquaculture sectors and the general political goals regarding food, agribusiness and environment as expressed in the governments Green Growth programme. Including an explanation of the projects focus on respectively the entire product/value chain or selected parts here of (e.g. primary production, processing, trade and transport) – max. ½ page. This project addresses three key issues identified as important for the development of the organic food sector; (1) marked driven growth, (2) credibility and (3) robust systems. The project thus aims to create the basis for marked driven growth through the development of high value products that will allow an expansion and development of the organic

meat market from its very limited role of today through activities in the entire food chain from farm production to consumption. The concept of high value products also comply with the general expectations for the development of the Danish agriculture sector towards more added value production also at the farm level side. While not directly included in the project, this developmental path will probably also make better room for new businesses, including SME's, specializing in supporting high value food chains.

At the same time focus is on credibility. Thus this project will combine alleviating environmental problems with increased animal welfare, which often otherwise are seen as competing traits. Through implementation of foraging for pigs and poultry, and basing the ration for young beef animals almost entirely on grazing/forages, the environmental load is anticipated to be reduced from free range systems as is the demand for global feed resources that also serves as human food.

The project also supports the development of more robust systems in the broad sense. At the level of economic robustness the project explores ways to reduce dependency on external inputs to the system, thus making the systems less vulnerable, and make the farm produce less exposed to price competition. At the animal level it is expected that the meat production systems developed will make the animals more robust regarding health.

A12.4 The projects innovative value, relevance and effect including the specific barriers and development potential for the organic sector the project will solve and/or support (max. ½ page).

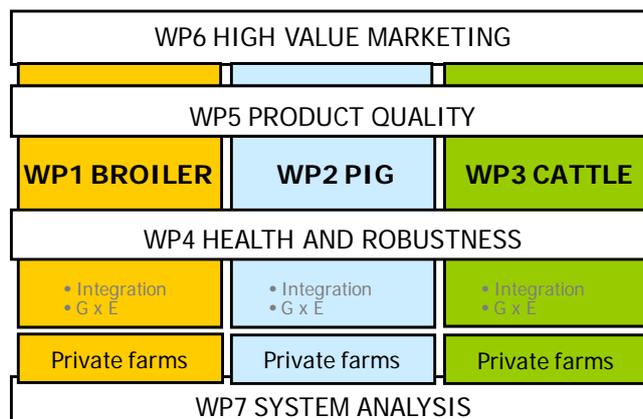
The novelty of this project is that it aims to overcome some of the main barriers identified for a further development of the organic meat production and at the same time comply with important animal welfare aspects and overall societal expectations to organic agriculture. This is done through the development and testing of very different systems than what is presently main stream within organic meat production. The project thus 1) explores ways to justify the significant price premium needed for organic meat by adding marketable value to the product instead of seeking to reduce cost, 2) explores ways to fulfill the nutritional needs of the monogastrics for essential amino acid through home produced food instead of imported, 3) reduces the environmental impact of free-range livestock production through higher recirculation of nutrients within the farm land instead of depositing imported nutrients on the grown land and, 4) improves animal robustness and thus welfare by allowing the animals to better express their innate behavioral needs and health competences.

Another relevant issue addressed is the generally expected high global warming impact connected with 'traditional' slow growing organic steers. By utilizing younger beef animals and crossbreeding a high growth rate (but still at pasture) and a lower methane emission per kg of beef produced can be expected.

The project also addresses scientific challenges regarding how to estimate nutrient intake from foraging animals (which is an important aspect in organic livestock production) and how such conditions impact on the animal's immune competences and thereby the robustness of the animals.

A12.5 Description of activities, methods and expected results divided into work packages with clear denotation of which activity the applicant consider to be either Research, Development or Demonstration. The coherence between work packages must be clearly described and the relation between activities and the tables with milestones and deliverables must be logical and consistent. Moreover, the primary target groups should be clearly identified with a description of how these will be met by the project (max. 1 page per WP and max. 3 pages in total).

The project has its starting point in the need for developing a production and market strategy for high value organic meat products that will increase the supply of organic meat in Denmark from broilers (WP1), pigs (WP2) and young cattle (WP3). It is recognized that across the species in question, there are similarities in concepts and methodologies for market development and in relation to product quality as well as in the search for general fit and health and robustness of the animals. These common features are built into the matrix organization of the project (WP4, 5, and 6)



as indicated in the figure, and it is foreseen to add synergies to the scientific work as well as to the budgetary aspects. In the three vertical WP's new production systems are investigated through on-station experimental work and farm testing within species. With all species, it is a common feature that we look at integrated production systems from 'animal to product'. Also, for all species we aim at utilizing different genotypes (G) and crossbreeding and study the potential positive interaction with the organic production environment (E).

The main efforts and expected results of WP 1 – 6 are research and research results, while WP 7 is dedicated to development and demonstration activities in the sense that it is explored - through interaction with producers - how the research results may be implemented and what impact could be expected at the farm level in relation to production economy and environmental aspects. In particular for WP 1-3 there is a close connection with WP 7. In addition one WP (WP8) is dedicated to project management.

WP 1 Utilization of locally produced feeds in organic broiler production systems

Aim: the aim is to investigate to what extent foraging can contribute to the nutritional needs of different broiler genotypes differing in growth rate through appropriate feeding strategies and access to an attractive foraging area. **Methodology:** An experiment designed with three different genetic broiler lines and three different feeding strategies will take place in 2012. Feeding strategies will be based on the choice feeding principle and include diets with different contents of protein and different feed items, combined with access to foraging material on the outdoor area. The quantitatively and qualitatively intake of diets and foraging material will be measured to evaluate the nutritional value and contribution with essential amino acids (Horsted et al., 2007; Steinfeldt et al., 2007). Two weeks before slaughtering, the most successful strategies so far will be selected for the final experimental phase including two different fattening strategies with the aim to produce the best possible meat (investigated in WP5). Together with 'Videncentret – Fjerkra' two private organic farms in DK will be selected for **demonstration** of the concept. **Expected results:** identification of a feeding strategy x genotype combination that improves the utilization of locally produced feeds, the health and welfare of the broilers (foot health, robustness against diseases) and result in new high quality broiler meat products.

WP2 Organic pork production based on pigs integrated in the cropping system

Aim: To evaluate the nutritional intake (energy, protein, micro nutrients) from foraging growing pigs of two different breeds in relation to pig performance, pork quality, and robustness. **Methodology:** An experimental design with two different breeds and three different feeding strategies in three replications are planned. Feeding strategy include *ad libitum* feeding with a basal organic ration, restricted feeding with the same diet and restricted feeding but without any vitamin and mineral supply. Pigs will have access to a variety of crops appropriate for the season of the year. Blood and tissue samples will be evaluated to determine micronutrient status (Carlson et

al., 2007). Pig performance, foraging behaviour, and crop sampling will be evaluated to quantify energy- and protein intake (Andresen, 2000). The crops are chosen to provide the pigs with considerable amounts of energy, protein and micronutrients and/or have an (expected) positive effect on meat quality. Breeds are chosen to represent a modern and a traditional breed, e.g. the traditional Danish black-spotted that have been associated with improved meat quality (Kongsted et al., 2008). **Demonstration and development** of the concept will take place at “Center of Development for Outdoor Livestock Production” and at two private organic farmers who are partners in the project. **Expected results:** to create basis for a new production strategy where foraging designed cropping system will contribute significantly to the energy, protein acids, minerals, and vitamin requirements of growing pigs.

WP3 High quality Beef from Efficient Crossbreeds

Aim: To investigate the effect of an herb-enriched grass sward compared with a traditional clover-based grass on eating quality of beef and short-term growth performance of slaughter calves (Exp 1) and to investigate how beef-crosses of both sexes can improve meat production efficiency and carcass quality of a pasture-based production system (Exp 2). **Methodology:** Exp 1 will utilize very lean young DH bull calves which are a good model for assessing expected changes in flavor components in the protein part of the muscles. Exp 2 is based on 15 DH bulls, 15 LIMxDH bulls and 15 LIMxDH spring born heifers. Animals are turned-out on clover-based high yielding pastures in sex- and genotype-based groups of 5 animals in a rotational grazing system with 9 equal paddocks and a 2-week shift-interval. After 3 mo. of 1st year grazing, 6-7 mo. of winter feeding on clover-grass-based rations and a further 4-5 mo. of 2nd year grazing (same system), all animals are slaughtered at a fixed age (1½ year) and meat is sampled for analyses (WP5). LW is measured frequently, and blood and faeces are obtained strategically to assess immune and gut-related robustness parameters (WP4). **Expected results:** New knowledge about consequences for taste and fatty acid composition of two potential and relevant organic roughage-based beef rations. An evaluation of growth, efficiency, health-related issues and overall production economy of a novel and yet untested production system for both bull and heifer crosses.

WP4 Health and Robustness in livestock production

Aim: To investigate the robustness of the animals as affected by the experimental treatments in WP's 1, 2, and 3 by use of relevant immune responsiveness parameters. **Methodology:** The following measurement will be done 1) In swine and poultry: the gastrointestinal numbers of microorganisms including lactic acid bacteria, *E. coli*, *Enterococci* and yeast as well as molecular fingerprinting by terminal restriction fragment length polymorphism (T-RFLP) at different time points. 2) In poultry and swine: the colonisation resistance to *Salmonella typhimurium* at different time points using an *in vitro* model (PIOC model (Naughton et al., 2001)). 3) In poultry: the phagocytotic potential as well as nitrite production in polymorphonuclear cells (PMN) after stimulation of purified PMN cells with lipopolysaccharide (LPS) from *Salmonella* at different time points. 4) In swine: the ability of lipopolysaccharide (LPS) from *Salmonella* to stimulate polymorphonuclear cells (PMN) in whole blood samples at different time points. (Juul-Madsen et al., 2010). 5) In cattle at three different time points: the acute phase proteins (APP) in blood, the innate and adaptive leukocyte cytokine responsiveness towards killed *Salmonella dublin*, *Pasteurella multocida* and *E. coli* in whole blood samples (Røntved et al., 2005). **Expected results:** to give an extensive view of the immune capacity and robustness in poultry, swine and cattle as affected by breed and the novel treatments introduced in this project.

WP 5 Product quality and development of meat from efficient and robust animal

Aim: the aims of the WP is to 1) Understand the consumers and meat buyers preferences and habits regarding organic meat, 2) quantify the actual quality of the meat produced in the three innovative systems of chicken,

pork and beef, 3) adjust the produced qualities through changes in the production system or in the post mortem handling so they match the consumer demands and 4) develop new processed products which add further to the total value of the production systems. **Methodology:** Consumer beliefs and preferences will be investigated through focus group discussions with private consumers, and semi-structured (“expert”) interviews will be carried out with restaurant chefs and professional buyers in major retail chains. Meat samples from the animals produced in WP1, WP2 and WP3 will be analysed for pH, colour, fat content and composition, drip loss, vitamin E, vitamin D, oxidation susceptibility, shear force and sensory perception. This will be done in the initial phase as well as after production adaptation to better fulfil meat quality demands. Based on results generated in 1) (ie. what kind of organic meat products is missing at the market?), examples of processed products which is characterised with high added value will be developed from each production system and these as well as fresh meat from the improved production systems from 3) will be tested for consumer responses in the choice situation (WP6) and in a trial setting of a meal (this WP). **Expected results:** Better knowledge of the interaction between the production conditions and the characteristics of the animals at slaughter and post-mortem handling in relation to final quality. Guidelines for high value organic meat products meeting the consumers’ expectations of organic meat.

WP6 High value marketing

Aim: to identify and define the strategic group or submarket(s) on which these products are going to compete and the companies and products that will represent the most direct competition, and to suggest marketing strategies for specific products within each of the three product areas. **Methodology:** The strategic group analysis will be the point of departure for semi-structured expert interviews with representatives from the retail sector and industry experts with the aim of getting an up-to-date and rich description of the most relevant strategic groups and product sub-markets. Case studies will be carried out on successful high-value products in each of the three product areas and within relevant strategic groups and the reasons for their success identified. The developed marketing concepts will be tested with three methods: 1) Focus group discussions with two groups of private consumers; 2) Semi-structured (“expert”) interviews with representatives from major retail chains, and 3) online survey with a representative sample of Danish consumers. We simulate the shopping choice situation by means of a multi-media-based discrete choice experiment (DCE) that varies extrinsic quality cues (visual attributes) to produce shelf-like choice scenarios. **Expected results:** Identification of the optimal market position for high-value organic meat products, a realistic description of the competition, a marketing strategy and plan for Danish high-value organic meat products, and an assessment of the likelihood of success.

WP7 System analysis and outreach

Aim: To investigate and demonstrate the sustainability of the innovative elements in WP1 -3 at farm level taking into consideration the potential market value explored in WP5 and WP6. **Methodology:** Initially a vision workshop will be organized with 3-6 stakeholders in the chain for each of three types of products – broilers, pig and beef –focusing on development potential and existing barriers. During the course of the project demonstration activities of the consequences at farm level will be organized. By use of prototyping the expected productivity, economic performance, and the possible effect on climate change will be modeled for typical farms and used for development of information material. The target groups are advisors and farmers. Finally, papers will be produced for Danish magazines. **Expected output:** Awareness of development potential raised among Danish producers, advisors and decision makers in the meat food chain, and a formal analysis of the environmental and economical consequences at farm scale.

WP8 Project management

Aim: To secure the progress and the coordination of the activities according to plan, to have the mandatory

reporting timely, and to make sure that the project results are disseminated according to the plan for the individual WP's. **Methodology:** Organizing a kick-off meeting with project participants and relevant stakeholders. Organize biannual WP leader meetings to coordinate activities, solve any occurring problems and – not least – to discuss and decide how the results are most appropriately disseminated nationally and internationally, taking advantage of the events that regularly takes place at farmers', and scientific meetings in which the project participants are involved. Besides, dedicated sessions to the theme of the project will be (sought) arranged at the annual EAAP meetings. To facilitate the scientific dissemination the project group in total will be gathered to exchange results twice prior to the annual reporting. **Expected output:** Timely course of the project and that the synergies between WP's as outlined above are utilized.

A12.6 Description of how it will be ensured that the project results can be implemented in practice and perhaps commercialized (max. ½ page). By developing and testing three specific production concepts (broilers, pigs, and young cattle) from animal to marketable product, the basis for implementation of the results generated is available. In relation to practical farming the project has two participating pig farmers and the Center for Development of Outdoor Livestock Production. The Center mentioned is partially owned by the major player within slaughtering and distribution of organic pork in Denmark, which thus will have immediate access to the results. Within organic poultry and cattle production two advisors from Knowledge Centre for Agriculture are partners in the project. The advisors are actively involved in the project (WP1 and 3) as well as in running the on-station and/or on-farm growth experiment and will also be involved in the dissemination of results at local meetings and at the annual national conferences for cattle and broiler producers. These partnerships between scientists and advisors, the publications in national farmers magazines etc. together with the activities in WP 7 are expected to ensure that the implementation potential is fully explored. The deliverables (see A14-A17) linked to the different production concepts developed (broilers, pigs, young cattle) will be in a format suitable for advisors' and veterinary practitioners' direct use.

Furthermore, at the processing side (WP5) there is collaboration with Educational Centre Holstebro (Holstebro Tekniske Skole) in the development of new products and cuts with high-added value from the three improved production system concepts. Holstebro Tekniske Skole is a centre of education which holds all technical educations within the food industry, e.g., chefs and butchers, as well as in-service training of butchers and chefs. The project results will be used in the teaching of students within the food industry as well as already established butchers etc.

The marketing research includes interaction with decision makers at the retailer level, which is expected to create the necessary awareness of the marketing potential.

A12.7 Description of possibilities for a general utilisation of the results (max. ½ page). The development path followed in the project addresses general aspects of producing and marketing organic meat with value added at the farm level and is expected to yield practical applicable results to the benefit of other food groups.

The outputs will also be in a format, so it is easy for consultants, advisors and veterinary practitioners to make use of the results and to use these in whole or in part in their advises and action plans to organic farmers.

The scientific contributions are expected to have a general interest for the scientific community in aspects regarding 1) estimation of nutrient intake by foraging, 2) the interaction between genotype and diet/management on meat quality and immune competences of the animal, 3) influence of postmortem handling on meat quality parameters, and 4) concepts for branding in the meat sector. For this reason, scientific publishing is also a main deliverable from all work-packages.

A12.8 Description of the coherence between the research, development and demonstration activities in the project, including involvement of relevant users of the results (max. ½ page).

The main users of the results and outcome of this project are the organic farmers, their advisors in a broad sense, slaughterhouses, the meat processors and the retail level.

Though six WP's are primarily dedicated to research, feed-back processes are ensured in a number of situations inherent in the project. Thus, a fine tuning of the experimental activities will take place after a vision workshop involving participants and other stakeholders from the respective meat chains. In each of WP's 1, 2, and 3, demonstration and assessment activities takes place at the farm level. This activity is co-ordinated by WP 7, which is dedicated to demonstration activities. This will give a direct implementation platform of the results and the farms will be open for the public at specific days, where the relevant project members will participate. Advisors and practitioners in the field will be invited to participate in these demonstration activities and will receive written output also (see Deliverables). Also for WP1 the hatchery 'Topæg Aps' will assist in making sure that the suitable genotypes for the project can be produced.

At the processing side there is collaboration with Holstebro Tekniske Skole in the development of new products and cuts. It is build into the project that feed backs from pilot studies in 2011 (WP 5) can impact on the experimental activities planned for 2012 and 2013. The collaboration with commercial slaughterhouses during slaughter of the animals in the project secures a close contact to the industry, and development of solutions which is relevant and can be implemented at the slaughterhouses. In particular for poultry a new innovative organic slaughter house (Sødams Økologisk Fjerkræslagteri) supports the project by assistance with the slaughtering of the chickens and with knowledge and feedback about the slaughtering process and quality aspects of these animals that probably will be larger than ordinary commercial chickens.

It will be the role of the respective WP leaders in WP's 1-3 in co-operation with WP 7 to model the overall farm level impact of introducing the novel methodologies as basis for communication between stakeholders.

A12.9 Project organisation, management and administration (max. ½ page). The project is organized in 8 WP's. Apart from the seven WP's indicated in the figure below, a specific WP 8 is dedicated to project management and headed by the applicant, Head of research Unit John E Hermansen. The management group, all part of WP 8, consists of the WP leaders:

WP1: Senior Scientist Sanna Steenfelt

WP2: Scientist Anne G Kongsted

WP3: Head of research Unit Mogens Vestergaard (and contact person for DJF-HBS)

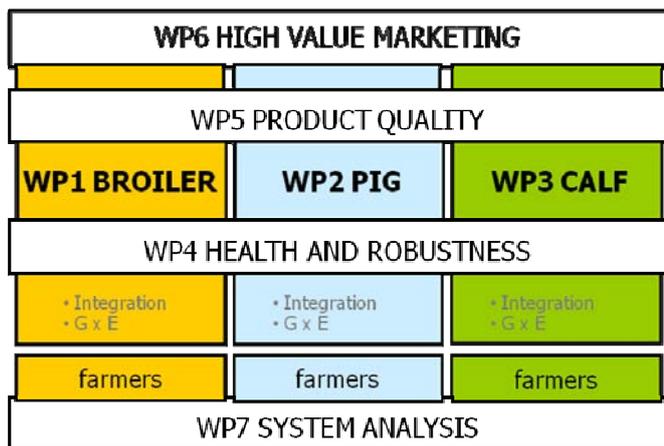
WP4: Senior scientist Helle Juul-Madsen

WP5: Senior scientist Margrethe Therkildsen (and contact person for DJF-IFK)

WP6: Professor John Thøgersen (and contact person for ASB-MAPP)

WP 7: Senior scientist Troels Kristensen

Besides managing their WP, the WP leaders have a particular role in facilitating the mutual exchange of knowledge for the progress of the project and contribute to the mandatory reporting, for which the project leader has the responsibility. In addition, the management team has a particular responsibility in securing an efficient dissemination of the results and especially the results of the more integrated analyses across the WP's. These task are secure through biannual meetings in the management group, and ad hoc communication.



A12.10. The technical competences of the partners and their contribution to the project including how they complement each other (max. 5 lines per partner).

The research partners represent competences within animal nutrition and health (HBS), product quality (IFK), organic production systems (JPM) and marketing (MAPP) which are highly complementary seen in relation to the expected scientific as well practical results of this project. Others partners represent farming practice within pigs, poultry and cattle as advisors and farmers.

JPM- Department of Agroecology and Environment carries out research within 1) Soil function, 2) Crops and production systems, and 3) Regional analyses and decision support at national level. The research group ‘Farming Systems’ which is involved in this project, has a long record with research and development activities within organic livestock systems including co-operation with. JPM holds the project leadership, is leader for WP 2 and WP7 and contributes to WP1.

MAPP – Centre for research on customer relations in the food sector carries out research on the development, marketing and distribution of foods and aid structuring the product development processes in companies. Has been involved in a number of national and inter-national funded projects relating to organic products and/or the evaluation of meat quality. MAPP is heading WP6 and contributes to WP5.

IFK- Department of Food Sciences main research areas are quality differentiation of raw materials, healthy foods creating well-being and finally food processing technology. New and unique research facilities for in vitro research, proteomics, metabonomics, sensory sciences, research in oxidation and food functionality are available at the department. Responsible for meat quality assessment and handling, and is leading WP 5 in this project.

HBS – Department of animal health and bioscience conducts research and innovation within the disciplines nutrition, physiology, cell biology, immunology, ethology, disease prevention, epidemiology, microbiology and production and health management. HBS contributes to the project in all phases of planning, accomplishment and evaluation of the studies with broilers (WP1), pigs (WP2), cattle (WP3), in the across-species evaluation of health and robustness (WP4), with the meat quality analyses (WP5), and supplies data to WP6 and WP7. HSB has excellent facilities, technical staff and experience for carrying out experimental work with free range poultry, pigs and cattle.

Center of Development for Outdoor Livestock Production has recently been established by Friland A/S in cooperation with The Danish Animal Welfare Society. The purpose of the center is to promote sustainable outdoor livestock production with high standards for animal welfare. Currently there is one demonstration farm affiliated. The farm is based on outdoor production of 300 sows. The Center will be essential in demonstration activities in WP 2.

Organic pig producer Karl Schmidt has an outdoor pig production of 50 sows and their offspring. The pigs are weaned at ten to twelve weeks of age and the growing-finishing pigs are outdoors in paddocks until 80 kg. Karl has on his own initiative conducted several small “experiments” with alternative feed stuff for pigs, e.g. chicory and artichoke. Karl cultivates 120 hectare. Karl will contribute with testing the concepts developed in WP 2

Organic pig producer Poul Lang Nielsen has currently an outdoor production of 100 growing-finishing pigs and is cultivating 12 hectare. The pigs are mainly fed with home-produced feed like e.g. barley, rye and peas. The pork is sold to private consumers and restaurants. The herd is expected to expand the following years to 20 sows and their offspring. Poul will contribute with testing the concepts developed in WP 2

Knowledge Centre for Agriculture, the Danish Agricultural Advisory Service (DAAS) is a partnership made up of 31 local advisory centre’s and a knowledge centre. This unique two-level advisory system is both owned and used by Danish farmers. The partnership employs approximately 3,500 professionals. In this project members of the Department for Poultry contributes with demonstration activities in WP1 and members from Cattle Department contributes with research, development and demonstration activities in WP 3

A12.11. Expected collaboration with other research institutions/companies nationally and internationally (max. ½ page). A number of institutes/companies are partners in the project. Apart from these partners, nationally the slaughterhouses Friland and Sødams have expressed their interest and support to the project as has the hatchery Top-æg.

The research on young beef is foreseen co-ordinated with initiatives by Økologisk Landsforening, which is seeking to establish an experiment with bull calves born either in the spring or the autumn and slaughtered either from the pasture or after winter feeding. Experiences from these two experiments will be shared.

In relation to WP1 complementary activities in a Ph.D.-project takes place in co-operation with Federal University of Parana, BRAZIL, focusing on how to reduce the infection with internal parasites when broilers are reared in a system based on a high intake of foraging material from an enriched outdoor area.

The project links to a recent EU FP7 project (SOLIDS) on sustainable organic low input dairy production systems in its common search for relevant biological markers of animal robustness in organic production and in its strive of producing high-value good quality products. Thus, some of the methods used to assess robustness and quality aspects will be shared among the core partners for these aspects: Aberystwyth University (UK), Universitaet Fuer Bodenkultur (Austria), and Agrifood and Biosciences Institute (UK).

A12.12. The relation to previous projects within the projects focus areas (if any) including references to these (max. ½ page). Part of WP 1 focusing on 'Utilization of locally produced feeds in organic broiler production systems' (SUMMER) can be related to the former project QEMP project (Quality and Integrity of Organic Eggs, Chicken Meat and Pork) under DARCOF III 2005-2010, where two work-packages focussed on 'Improvement of organic eggs' and 'Integrated broiler and apple production'. In the layer study, one of the main purposes was to investigate different ways of obtaining high and differentiable quality of organic eggs in relation to genotype of hen and the inclusion of home-grown forage in the diet. The results from this project can specifically be used in the planning of the experiments with organic broilers in WP1 with regard to selection of foraging material with a high quality and for selection of relevant genotypes in the present study. Similarly, in WP 2 focussing on pigs integrated in the land use, the starting point will be the results on growth and meat quality from a traditional breed obtained in QEMP:

Regarding pork post-mortem handling results from our earlier project 'Organic pork in top-grade through optimal handling at the slaughter line' (supported by the Danish Food Industry Agency, The Danish Bacon and Meat Council, and 'Fonden for økologisk landbrug' will form a starting point.

A13. Tables with milestones and deliverables with information as requested in the table in A16. The detail milestones are given in Table A16.

A14. List of deliverables from the project (also fill out the table in A17)
The detail deliverables are given in Table A17.

A15. List of appendices

1. References
2. CV's
3. Letters of support

A16. Milestones and time schedule for the entire project

wp no.	Milestone no.	Title/activity	Responsible project participant	Date/year	Other participants
1	1.1	Broiler genotypes selected and formulations of experimental diet	Sanna Steinfeldt	12/2011	Klaus Horsted
1	1.2	Rearing of broiler genotypes and start of experiment	Klaus Horsted	05/2012	Sanna Steinfeldt
1	1.3	Main experiment finished	Sanna Steinfeldt	10/2012	Klaus Horsted, Helle Risdahl Juul-Madsen
1	1.4	Evaluation of data, sparring with organic broiler producers and possibility for implementing of new genotypes and feedings strategies in practice	Klaus Horsted	10/2013	Sanna Steinfeldt, Helle Risdahl Juul-Madsen, Brian Eskildsen
1	1.5	Publication of papers in national and international journals	Sanna Steinfeldt	12/2013	Klaus Horsted, Helle Risdahl Juul-Madsen
2	2.1	Development activities have been established in two private herds	Anne Grete Kongsted	06/2011	Poul Lang Nielsen, Karl Schmidt
2	2.2	Pilot studies have been carried out and results evaluated	Anne Grete Kongsted	01/2012	Charlotte Lauritsen, Dorthe Carlson, Søren Krogh Jensen
2	2.3	Main experiment has been established	Anne Grete Kongsted	06/2012	Charlotte Lauritsen, Dorthe Carlson, Søren Krogh Jensen
2	2.4	Demonstration and development activities at "Center of Development for outdoor livestock production" have been established	Simme Eriksen	06/2012	Anne Grete Kongsted, Charlotte Lauritsen, Dorthe Carlson, Søren Krogh Jensen
2	2.5	Main experiment is finished	Anne Grete Kongsted	12/2012	Charlotte Lauritsen, Dorthe Carlson, Søren Krogh Jensen
2	2.6	Mineral analyses have been carried out	Dorthe Carlson	04/2013	Charlotte Lauritsen, Søren Krogh Jensen
2	2.7	Vitamin analyses have been carried out	Søren Krogh Jensen	04/2013	Dorthe Carlson, Charlotte Lauritsen
3	3.1	Short-term experiment with herbs-enriched grass-feeding for bull calves on feed intake and product quality finished	Mogens Vestergaard	07/2011	Margrethe Therkildsen
3	3.2	Production experiment on crossbreeding and sex-effects on performance and health of beef calves finalized	Mogens Vestergaard	09/2013	Kirstine F Jørgensen, Christine M Røntved, Troels Kristensen
3	3.3	Publication and dissemination of results finalized	Mogens Vestergaard	12/2013	Kirstine F Jørgensen, Margrethe Therkildsen, Christine M Røntved, Troels Kristensen, Søren K Jensen
4	4.1	The PIOC model has been established in	Ricarda Engberg	03/2012	Helle Risdahl Juul-Madsen

		poultry			
4	4.2	The LPS stimulation assay has been established in poultry	Helle Risdahl Juul-Madsen	03/2012	
4	4.3	The immune responsiveness parameters in poultry have been analysed	Helle Risdahl Juul-Madsen	04/2013	Ricarda Engberg
4	4.4	The immune responsiveness parameters in swine have been analysed	Helle Risdahl Juul-Madsen	04/2013	Charlotte Lauridsen
4	4.5	The immune responsiveness parameters in cattle have been analysed	Christine M.Røntved	06/2013	
5	5.1	The consumers and meat buyers expectations and preferences of organic beef, pork and chicken has been established	Margrethe Therkildsen	06/2011	John Thøgersen NN (postdoc)
5	5.2	Feed back on meat quality aspects from pilot experiments have been given	Margrethe Therkildsen	04/2012	John Thøgersen NN (postdoc)
5	5.3	The sensory and technological quality of meat produced in WP1, WP2 and WP3 has been described	Margrethe Therkildsen	10/2013	Søren Krog Jensen
5	5.4	New meat products has been developed and tested towards consumers and meat buyers	Margrethe Therkildsen	12/2013	John Thøgersen NN (postdoc)
6	6.1	Literature review, strategic groups finalized	John Thøgersen	12/2011	NN (postdoc)
6	6.2	Market structure, competition and strategic groups in Denmark Sweden, Germany and UK finalized	John Thøgersen	12/2011	NN (postdoc)
6	6.3	Expert interviews with representatives from the retail sector and/or industry experts	John Thøgersen	04/2012	NN (postdoc)
6	6.4	Case studies, successful high-value products in each of the three product areas	John Thøgersen	09/2012	NN (postdoc)
6	6.5	Qualitative concept tests with private and professional consumers carried out	John Thøgersen	04/2013	NN (postdoc)
6	6.6	Survey-based concept tests carried out	John Thøgersen	06/2013	NN (postdoc)
6	6.7	Publication and dissemination of results finalized	John Thøgersen	12/2013	NN (postdoc)
7	7.1	Vision workshop finalized	Troels Kristensen	05/11	All
7	7.2	New farming systems defined	Troels Kristensen	09/12	WP leaders
7	7.3	System assessment finalized	Troels Kristensen	10/13	John E Hermansen
8	8.1	Kick off meeting	John Hermansen	02/11	All
8	8.2	Biannual project meetings	John Hermansen	02 and 09/x	Wp leaders

A17. List over deliverables (D=deliverables) for the entire project, stating whether the deliverable belongs to the research part of the project (R); the development part (D); and/or demonstration (Dm).

D. no.	Deliverable	Responsible project participant	Date/year	R, D, or Dm Effective working time, months¹	Type of deliverable*
D 1.1	Conference presentation of the results on performance and meat quality in organic broilers	Sanna Steinfeldt	02/2013	R, 2 mo Dm, 2 mo	S4
D 1.2	Article in ICROFS news on "Effect of genotypes and feedings strategy on productivity and meat quality in organic broilers	Klaus Horsted	05/2013	R, 1 mo	P1
D 1.3	Scientific paper on: "Quality of foraging material and effect on nutrient digestibility in organic broilers fed diets with different protein content	Sanna Steinfeldt	12/2013	R, 10 mo	S1
D 1.4	Scientific Paper on : "Effect of choice feeding on production, welfare and meat quality parameters in organic broilers"	Klaus Horsted	12/2013	R, 9 mo	S1
D 1.5	Stakeholder and planning meeting with poultry consultant and poultry producers and possibilities to implement new genotypes and feeding strategies	Sanna Steinfeldt	06/2013	Dm, 6 mo	P2
D 2.1	Newsletter presenting preliminary results from pilot studies and demonstration activities	Anne Grete Kongsted	03/2012	R, Dm, 2mo	P1
D 2.2	Paper on Pigs integrated in cropping systems – Performance, energy and amino acid intakes	Anne Grete Kongsted	12/2013	R, 8 mo	S1
D 2.3	Paper on Pigs integrated in cropping systems – Mineral and Vitamin status	Dorthe Carlson	12/2013	R, 8 mo	S1
D 2.4	Newsletter on Mineral and vitamin status in pigs integrated in cropping systems	Søren Krogh Jensen	12/2013	R, Dm 2 mo	P1
D 2.5	Newsletter on Performance of pigs integrated in cropping systems	Anne Grete Kongsted	12/2013	R, 8 mo	P1
D 2.6	Presentation of results at conferences	Anne Grete Kongsted	12/2012 and 2013	R, 3 mo	P2
D 3.1	Presentation of feed intake and eating quality from exp. 1	Mogens Vestergaard	08/2012	R+D, 4 mo	S4, P1, P2
D 3.2	Presentation of production results from cattle exp. 2	Mogens Vestergaard	12/ 2013	R+D, 7 mo	S4, P1, P2
D 3.3	Scientific publication – Performance, health and carcass quality of purebred Holstein and beef crosses raised in an organic production system	Mogens Vestergaard	12/2013	R, 7 mo	S1
D4.1	Presentation of robustness parameters in poultry at conferences and in peer reviewed journals	Helle Juul-Madsen	10/2013	R, 8 mo	S1, S4
D4.2	Presentation of robustness parameters in swine at conferences and in peer reviewed journals.	Helle Juul-Madsen	10/2013	R, 7 mo	S1, S4

¹ The total amount of months must be consistent with the total number of months in the budgets, and will therefore show the relative working effort per work package.

D.4.3	Presentation of robustness parameters in cattle at conferences and in peer reviewed journals	Christine R. Røntved	10/2013	R, 6 mo	S1, S4
D 5.1	Scientific paper on: "High quality meat from robust organic production systems"	Margrethe Therkildsen	12/2013	R, 14 mo	S1
D 5.2	Presentation at international Meat science congress: "High quality meat from robust organic production systems"	Margrethe Therkildsen	10/2013	R, 5 mo	S4
D 5.3	Use of generated knowledge when teaching in meat science at BSc, MSc and PhD level at AU	Margrethe Therkildsen	12/2013	R, 2 mo	C1, C2
D 5.4	Articles directed towards consumers and meat buyers in national journals	Margrethe Therkildsen	10/2013	R, 2 mo	P1
D 6.1	State of the art report on the meat market	John Thøgersen	11/2011	R, 3 mo	S3
D 6.2	Report on qualitative concept tests	John Thøgersen	06/2013	R, 5 mo	S3
D 6.3	Report on expert interviews WP6	John Thøgersen	06/2012	R, 3 mo	S3
D 6.4	Report on survey/quantitative concept test	John Thøgersen	08/2013	R, 3 mo	S3
D 6.5	Case studies report	John Thøgersen	11/2012	R, 3 mo	S3
D 6.6	Conference paper and presentation on the structure of the meat market and marketing strategy for a high value organic meat product (Target conference: EMAC/European Marketing Academy, yearly congress).	John Thøgersen	12/2012	R, 2 mo	S4
D 6.7	Scientific article on the meat market and marketing strategy for a high value organic meat product based on WP6 (Target journal: European Journal of Marketing)	John Thøgersen	05/2013	R, 4 mo	S1
D 6.8	Conference paper and presentation on consumer trade-offs and the importance of intrinsic and visual quality cues for making choices between organic and non-organic meat products based on WP6 (Target conference: IAREP/International Association for Research in Economic Psychology, yearly congress).	John Thøgersen	11/2013	R, 2 mo	S4
D 6.9	Scientific article on consumer trade-offs and the importance of intrinsic and visual quality cues for making choices between organic and non-organic meat products based on WP6 (Target journal: Food Quality and Preferences)	John Thøgersen	12/2013	R, 3 mo	S1
D 7.1	Report from vision workshop	Troels Kristensen	06/2011	Dm, 2 mo	P1
D 7.2	3 Farm meetings and presentations	Troels Kristensen	12/2012	Dm, 2 mo	P1, P2
D 7.3	Production and environmental impact at farm level on new innovative strategies	Troels Kristensen	12/2013	R, 3 mo	S1
D 8.1	Mandatory reporting	John E Hermansen	9/2011-13	R, D, Dm, 5 mo	C5

* Fill in the type of deliverable. Use the List of type of deliverables on the last page in Annex 3 "Instructions for filling in the application form".