Factsheet final findings Global Challenges Programme Call 1

Adapting pork production to local conditions in Brazil

Summary

To increase availability of low costs and locally produced pork as a high quality protein food, the LocalPork project aims to improve the efficiency of pig growth in Brazil by focusing on pig feed and pig genetics. Pigs can eat almost anything but are fed high quality feed such as corn and soy. This project aims to improve the efficiency of pigs grown in Brazil under local circumstances that are fed alternative ingredients. Genetic analysis showed that selecting purebred pigs is not 100% effective for improving performance of typical growing pigs that are crossbred. Therefore, including crossbred information such as performance and genotypes is important in genetic analyses as well as accounting for the different genetics of purebreds and crossbreds and different growing conditions. A methodology called BOA was developed to enhance the genetic improvement for feed efficiency in crossbred pigs. The method allows breeding programs for purebreds to use data recorded on crossbred pigs. BOA was shown to be effective but not computationally efficient which hampers its routine use. Another methodology called Metafounders (MF) is equally effective as BOA but in a more efficient way. The economic cost and environmental impact of pork production can be reduced when breeders give more emphasis to improving production traits, relative to reproduction traits. Also, diets with alternative ingredients were shown to have potential benefits, especially to avoid land use competition with cropland for human consumption. Different by-product ingredients were included in this analysis, including macauba cake.

Final Research Findings

The project has shown multiple findings. Firstly, the use of commercial crossbred information will improve genetic progress made for feed efficiency in pig production. Secondly, by-products like macauba cake can be included in pigs diet without affecting their performance, and it is recommended as they can improve the economic and environmental sustainability of pig production. Thirdly, the selection of purebred pigs based on a diet different from the diet used for commercial crossbred pigs does not jeopardize genetic progress. Lastly, breeders can reduce the environmental impacts of pig farming by focusing on traits that increase farm productivity. In summary, additional improvements in efficiency of pork production in Brazil that can be made through breeding are similar to those in other countries, while opportunities to improve efficiency by feeding different diets are greater than, for instance, in the Netherlands. Those involved in pig breeding and production in Brazil are aware of the technological improvements that can be made in pig breeding, while there seems to be a reluctance to consider feeding by-products to pigs. By-products are considered inferior and are expected to lead to reduced pig growth, but our results show this is not the case. Currently, an experiment is ongoing in Brazil to validate the generated results in local Brazilian circumstances, to obtain, in this way, acceptance of the innovations and achieve the anticipated impact from all parts of the project.

Message to

A) Actors from private sector:

- Breeding for local crossbred performance can benefit from directly targeting crossbred information (performance and genotypes). The MF model may be useful here.
- Breeders need to give more emphasis to improving production traits than reproduction traits for raising, at the same time, the economic and environmental sustainability of pig farming.
- The use of by-products in the diets of pigs creates market opportunities for producers and processors (e.g. macaúba processors).

B) Civil society and practitioners organizations:

- Organizations working to improve environmental sustainability of pork production might promote the use of by-products.

C) Policy makers:

- Policy makers may stimulate a consumption shift from pork that is produced using food crops to plant feed sources for better food security.
- Policy makers may encourage the use of by-products in the diets of pigs to reduce deforestation for growing corn and soybeans and thereby reduce environmental impacts associated with land use change.
- Validation of research findings under Brazilian circumstances is very important for acceptance of innovations by the industry.

Knowledge products

- Research article Assigning breed origin to alleles in crossbred animals. August 2016
- Research article Empirical determination of breed-of-origin of alleles in three-breed cross pigs. July 2016
- Research article Environmental and economic impacts of using co- products in the diets of finishing pigs in Brazil. September 2017
- Research article Genomic evaluation for a three-way crossbreeding system considering breed-of-origin of alleles. October 2017
- Research article Genetic correlations between feed efficiency traits, and growth performance and carcass traits in purebred and crossbred pigs January 2018
- Research article A stochastic bio-economic pig farm model to assess the impact of innovations on farm performance. April 2018
- Research article Effects of incorporating environmental cost and risk aversion on economic values of pig breeding goal traits. May 2018
- Research article Genotype by feed interaction for feed efficiency and growth performance traits in pigs. July 2018
- Research article Effect of feeding cereals- alternative ingredients diets or corn-soybean meal diets on performance and carcass characteristics of growing-finishing gilts and boars. September 2018
- Research article Effects of alleles in crossbred pigs estimated for genomic prediction depend on their breed-of-origin. October 2018
- Research article Response to a selection index including environmental costs and risk preferences of producers. October 2018
- Research article Genomic evaluation for a crossbreeding system implementing breed-of-origin for targeted markers. May 2019
- Research article Genetic correlations between growth performance and carcass traits of purebred and crossbred pigs raised in tropical and temperate climates. September 2019
- Abstract in proceedings (https://meetings.eaap.org/session/23-crossbreeding/). Relevance of genotyping crossbred pigs for selection of nucleus purebred pigs for finisher traits. August 2019
- Abstract in proceedings Genetic parameters for feed intake and growth curves in three-way crossbred pigs. August 2019

Knowledge networks

- Breed4Food is a consortium established by Wageningen University and Research, and four international animal breeding companies with the ambition to be the world leading center for research and innovation on livestock genetics.
- State University of São Paulo (UNESP), Faculty of Agricultural and Veterinary Sciences – Jaboticabal Campus.

Co-creation

This project investigates opportunities to improve efficiency of pork production by combining animal genetics, animal nutrition, and business economics. During the development of the project, the collaboration between Animal Sciences and Business Economics was very important to value the contribution of breeding and nutrition to improving the economics of local pork production in Brazil. Industrial data was provided by Topigs Norsvin for testing models and approaches by PhD1 and PhD3, to ensure results are relevant for breeding organizations. The project team observed reluctance of the pork industry in Brazil to consider using co-products as pig feed. Since co-products are commonly used in Western Europe, the Netherlands-Brazil connection is important to raise interest for their use in Brazilian pork production. Trials in Brazil are organized with industry partners and universities (UFV and UNESP) to show results in local Brazilian conditions. The Netherlands-Brazil connection is also relevant for academic exchanges; one PhD student from UFV visited WUR to learn about BOA method and to apply it to a Girolando cattle population from Embrapa. Another PhD student from UFV visited also WUR. At Topigs Norsvin, 2 students came for doing an internship, 1 undergrad and 1 master.

Consortium Partners

- Wageningen University and Research, Wageningen, the Netherlands
- Universidade Federal de Viçosa, Vicosa, MG, Brazil
- Topigs Norsvin, Beuningen, the Netherlands
- Topigs do Brasil, Curitiba, PR, Brazil

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Project website

F&BKP Research Project page