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Climate change, heat stress, and animal robustness: Future perspectives in pig production (#39)

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Short Abstract

The human population is projected to rise to nearly 11 billion people by the vear 2100, Concomitant to the overall population increase is an increase in meat production and consumption. However, an increase in the animal population has profound consequences for our earth. In 2004, the WorldWatch Institute concluded: 'The human appetite for animal flesh is a driving force behind virtually every major category of environmental damage now threatening the human future - deforestation, erosion, fresh water scarcity, air and water pollution, climate change, biodiversity loss, social injustice, the destabilization of communities and the spread of disease' Because of the conseguences of agriculture and livestock production, there is a need for improvements in efficiency of food production and management, and reductions in food loss and waste. Genetic improvement of pigs is key to this development, and has resulted in an unprecedented increase in lean growth rate, carcass guality and feed efficiency in commercial genetic lines. However, improved levels of production at high stocking densities with modern biotechnology must be supported by improved technology and increased quantity and/or guality of resources that allow for the expression of production traits, or may otherwise result in a reduction in robustness to environmental stressors.

For example, a shift towards warmer climates may move livestock animals out of their thermal comfort zones, resulting in reduced feed intakes and growth rates. Research shows that pig breeds that are adapted to tropical conditions may be better able to maintain growth when intake becomes restricted. Similarly, it was observed that, independent of genetic line, pigs with higher growth rates in a thermoneutral environment had lower growth rates in a subsequent heat stress challenge, indicating that high producing animals in thermoneutral conditions were less robust to heat stress, whereas those robust to heat stress showed a trade-off with production under thermoneutral conditions. These results emphasize the necessity to review breed choice and genetic selection objectives for improved heat tolerance to climate change: pigs of interest as selection candidates are those that are able to maintain high growth rates under heat stress, and these may not be the genetics with highest growth potential.

At the same time, because of the notion of unsustainability of the heavy dependency of the EU to soybean meal imports from international markets there is a growing interest in the need for feeding local feed resources and feedstuff co-products. For example, in 2013, a Focus Group on Protein Crops, set up by the European Innovation Partnership Agri, analyzed the potential to increase productivity and protein content of soybeans, rapeseed, sunflower, lupin, pea, faba beans, alfalfa and clover. They concluded that protein crops have a long way to go before being competitive, but this can be stimulated through different aspects of innovation. However, since the quantity and quality of feed resources limits productive output, production on lower-quality feeds may require a different type of animal with different performance characteristics than those currently selected in intensive, high quality input – high output production systems.

A necessary condition to maintain farm income on reduced production efficiency is compensation through price premiums. One of the best examples of economically successful sustainable pig production is Iberian pig farming in the Iberian Peninsula. This extensive production system contributes to the conservation of an ecosystem while providing individuals with more than 1 ha of 'dehesa' and fed a local diet of acorns without any chemical supplement. Meat products are destined to a niche market of highly priced drycured processed meat. However, when production methods are not compensated by niche products, price premiums need to come from willingness to politically enforce policies through subsidies and/or penalties. Since the fast-food industry is the main destination of cheap meat production, and the potential for mass production of protein through meat substitutes, insects or cultured meat is increasing, it may be reasonable to move towards taxation of 'protein from livestock animals', that are produced sustainably.

