Epidemiology and control of hazards in pork production chain – SAFEPORK
One health approach under a concept of farm to fork

Discussion
This longitudinal study provides the first direct evidence of the emergence and persistence of a new multi-drug resistant Salmonella strain (mSTM193) in an Australian pig herd, with clinical significance to both pigs and humans. Further, the identical MLVA profiles (A, B, C, E, and F) have been seen in an increasing number of human infections, with the result that pigs cannot be excluded as a possible source (Anon 2014a; Anon 2014b). Previous Salmonella farm studies conducted in Australia have largely been cross sectional and have generally isolated a variety of serovars, particularly when multiple colony picks are tested. A surprising finding in this study was the absence of isolates other than mSTM193 over the 13 months, despite the increased vigour of characterising 10 colonies picks per positive sample, in comparison to the common investigating laboratory practice of characterising only 1. The emergence of mSTM193 in Australia, a decade after its rise to prominence in Europe, raises questions as to its mode of entry, particularly considering Australia’s strict quarantine restrictions and the failure of Stm DT104 to appear at all. The resistance profile, ASSuT, reflects that seen in Europe (Hopkins et al., 2010). MLVA is a powerful and sensitive technique for strain differentiation in this setting. How long do they persist within a herd to inform human illness attribution investigation? What is clear from the study so far is that in order to answer the question ‘when are different MLVA profiles different?, possibly related? closely related? or the same?’ It is critical to gain both experience in the technique and an understanding of the context in which it is used.

References

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Antimicrobials in swine production, antimicrobial resistance, alternative strategies to antimicrobial use

Production of antibiotic-free pigs – tools and results
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Abstract
The present paper describes preliminary results from a Danish project with production of antibiotic-free pigs. The project herd is a traditional Danish 500 sow herd with weaned pigs on the same site. 1/3 of the pigs are kept until slaughter on an adjacent farm and remaining pigs are sold to local finishing producers. Before initiation of the project, the herd had a consumption of antibiotics around 50% of the threshold given by the Danish authorities. However, the farmer took the challenge to produce pigs without any antibiotics at all, with the initial goal to deliver 50% antibiotic-free pigs for slaughter. The measures implemented were a stronger focus on management and vaccination against Lawsonia intracellularis on top of Mycoplasma hyopneumoniae and PCV2 vaccination. The results are promising: In the first 6 months of the project, the herd has not only experienced reduced use of antibiotics, but also an increased productivity. The monthly prescriptions of antibiotics were lowered from 2.15 to 1.86 Animal Daily Doses (ADD) per 100 pigs per day in the sow herd and from 8.30 to 4.19 ADD/100 pigs/day in the weaners. Compared to the previous year, the piglet mortality in the farrowing unit dropped by 2.5%, the average daily weight gain in weaners increased by 34 g/day and the feed conversion rate dropped by 0.15 FE/kg. Data from finishers are not yet available.

Introduction
Danish pig producers use a low amount of antibiotics compared to many other pig producing countries, and the Danish consumption of antibiotics for livestock is among the lowest in the EU (ECDC/EFSA/EMA, 2015). Despite this, the Danish pig producers experience a continuous pressure from the public to reduce the amount of antibiotics further, recently intensified by an increasing occurrence of Livestock associated methicillin-resistant Staphylococcus aureus (LA-MRSA) (DANMAP, 2013). A political goal has been set to reduce the consumption of antibiotics in the Danish pig production by 15% from 2015 until 2018 (Danish Food and Medicines Agency, 2015). Inspired by the public debate, the present project was initiated with the purpose to increase the knowledge of what it takes to produce pigs for slaughter without use of antibiotics. The strategy for production of piglets without antibiotics was to keep the piglets strong enough to face infections without need for antibiotic treatment. This primary focus points were increased attention on the piglets in the first weeks after birth and vaccination against common diseases. Furthermore, the hygiene in the barns was increased in order to decrease the infection pressure on the pigs. Monitoring ensured that animal welfare was not compromised and that sick animals received treatment.

Material and Methods
The project herd is a typical Danish sow herd with 500 sows, weaning piglets to separate barns on the same site. At approximately 30 kg live weight, 2/3 of the pigs are sold to local finishing producers, and the remaining 1/3 of the pigs are kept for fattening on a neighbouring farm. The goal with the project was to deliver 50% or more of the pigs for slaughter without any antibiotic treatment from birth to slaughter.
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Six months after initiating of the project, the results regarding reduced use of antibiotics are promising. The overall antibiotic consumption in the sow herd decreased by 14% from a monthly average prescription of 2.15 ADD/100 pigs/day to 1.86 ADD/100 pigs/day. In the weaned pigs, the monthly average prescriptions have decreased by 50%, from a monthly average of 8.30 ADD/100 pigs/day to 4.19 ADD/100 pigs/day, mainly due to a reduction in prescription of antibiotics for treatment of intestinal disorders. The reductions have resulted in a steady decrease of the 9 month average of antibiotic consumption. Data from finishers are not yet available.

In the sow herd, production figures were at the same level or higher than the average of the previous year (Figure 1). In the weaned pigs, the average daily weight gain was increased, and the feed consumption was decreased (Table 1). The prewean mortality was lowered by 2.5%, but the postwean mortality was increased by 0.4% in the same period. Hence, the overall piglet mortality decreased by 2.1%. The optimized management procedures and hygienic precautions resulted in an increased work load, with approximately 12 extra working hours spent per week.

Discussion

During the first 6 months of the project, the farmer successfully reduced the consumption of antibiotics for both sows and weaned pigs without compromising the productivity. In the sow herd, most production figures were actually slightly better than in the previous year (Figure 2). The improvement was probably caused by the optimized management procedures with extra care for the piglets and focus on sow feeding, thereby providing the best possible milk production for the piglets. This assumption is supported by the drop in prewean mortality, which also can be used as a parameter for the quality of the management in the farrowing unit. There was a slight increase in postwean mortality but still, more pigs survived from birth to finishers are not yet available.

Results

The improvement was probably caused by the optimized management procedures with extra care for the piglets and focus on sow feeding, thereby providing the best possible milk production for the piglets. This assumption is supported by the drop in prewean mortality, which also can be used as a parameter for the quality of the management in the farrowing unit. There was a slight increase in postwean mortality but still, more pigs survived from birth to 30 kg live weight.

In the weaned pigs, consumption of antibiotics was reduced by 50% due to a lower frequency of treatments against intestinal disorders. Even with this low consumption of antibiotics, the productivity was increased, possibly due to the implementation of vaccination against Lawsonia intracellularis.

Vaccination against Lawsonia intracellularis controls the disease and improves production parameters in infected herds (Hardge et al., 2004), but vaccinated herds also use less antibiotics than non-vaccinated herds (Bak and Rathkjen, 2009; Bundgaard et al., 2012).

Figure 1: Average prescription of antibiotics (9 month average) measured as ADD/100 pigs/day before and after initiation of project with production of antibiotic free pigs. Source: Vetstat database.

Figure 2: Production figures in the sow herd in the first quarter after initiation of the project with production of antibiotic free pigs, compared to the average productivity in the previous year.
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The combination of lowered antibiotic consumption with improved production figures highlights the advantage of prophylaxis compared to treatment. Vaccination protects the pigs from onset of disease, thereby preventing damage to the intestinal mucosa, resulting in an increased growth rate of the vaccinated pigs compared to non-vaccinates (Bak and Rathkjen, 2009). Hence, vaccinated pigs perform better compared to non-vaccinated pigs, even if the non-vaccinated pigs receive antibiotic treatments after an outbreak of diarrhoea.

**Conclusion**

Preliminary results from the project are positive, indicating that it will be possible to produce at least 50% of the pigs without use of antibiotics. This is possible with herd relevant vaccination programs, including PCV2, Mycoplasma hyopneumoniae and Lawsonia intracellularis, and with continuous focus on caretaking and hygiene.

**References**

- DANMAP (2013): Use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark. ISSN 1600-2032, p 92.