Use of antibiotics and vaccines in herds under the “PurePork” program in Denmark

Jan Dahl

Danish Agriculture & Food Council, Axeltorv 3, Copenhagen, Denmark. E-mail:jd@lf.dk

Introduction

The Danish PurePork-program, owned by Danish Crown, a major Danish slaughterhouse, is based on a concept, where pigs do not receive any antibiotic treatments from birth until slaughter. Pigs are ear tagged at birth, and if they get sick, and are treated, the ear tag will be removed, and the pig can no longer be marketed as PurePork.

Materials and methods

Danish Crown delivered a list of herds identified by Central Herd Register-number, with dates for when they entered the program and dates, when they stopped, if that was the case.

For antibiotic use, we retrieved data from the Danish VETSTAT-database from all Danish pig herds from January 1. 2017 until October 31. 2022. Descriptions of the VETSTAT-database and the surveillance program for medicinal use in Danish farming can be found at www.danmap.org. Herds were classified as not PurePork, PurePork-candidate and PurePork participant. A candidate-herd was a PurePork-herd, but before or after it was active as a participant. 146 CHR-numbers participated in the program, 23 stopped being a pig producer in the period and 123 CHR-numbers were still producing pigs in November 2022, and 4446 CHR-numbers were not part of the program. Of the 123 herds still producing pigs, 93 are part of the program in November 2022, indicating that 30 herds, that were active, had stopped producing PurePork.

Treatments are standardized in the VETSTAT-database to an average weight of 200 kg per sow with piglets, 15 kg per weaner (7-30 kg) and 50 kg per finisher (>30 kg).

Data were analyzed in a generalized, linear model, including herd size as fixed effect and herd as a random variable (proc mixed, SAS Institute). Although residuals were not fulfilling all criteria for a linear model, due to a relatively large number of observations with higher-than-expected use per month, it was decided not to remedy this problem, since differences between the use in the three types of herds were so marked. Results are presented both as simple means per herd-type and as LS-MEANS-estimates, considering herd size and the random effect of herd.

For vaccines, herds that were active in the program in November 2022 were contacted to deliver a file extracted from VETSTAT on vaccines delivered to the herd. This information can only be obtained by the producer or the associated veterinary practitioner. Use of vaccines from the entire production without herd-identification could be retrieved from VETSTAT by the author for comparison. 93 herds were active in November 2022 and 88 herds delivered data, that could be used for analyses.

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SPF-status was obtained from the Danish Specific Pathogen Free-register (www.spf-sus.dk). A description of the Danish SPF-system can be found on www.spf-sus.dk.

Results and discussion

Table 1 shows the average number of standard-treatments per sow, weaner and finisher in the non-PurePork production, PurePork herds outside the period, where it was part of the program, and PurePork herds in the period.

Table 1. Average number of standard-treatments of antibiotics per 100 days per sow/pig

	Sows	Weaners (7-30 kg)	Finishers (>30 kg)
Standard weight for treatment	200 kg	15 kg	50 kg
Not PurePork mean	1.99	8.14	1.56
LS-MEANS estimate (C. L.)	2.02 (1.98-2.05)	7.83 (7.65-8,01)	1.54 (1.51-1,57)
Number of herd months	100.853	151.301	260.502
PurePork-candidate mean	1.79	4.97	1.36
LS-MEANS estimate (C. L.)	1.74 (1.41-2.07)	3.74 (2.42-5.05)	1.23 (1.01-1.45)
Number of herd months	549	864	2.580
PurePork in the period mean	1.71	1.80	0.57
LS-MEANS estimate (C. L.)	1.77 (1.52-2.02)	2.16 (0.98-3.43)	0.54 (0.35-0.73)
Number of herd months	1.715	2.797	5.185
P-value based on LS-MEANS	0.10	<0.0001	<0.0001

The statistical model did not satisfy the assumption, that the studentized residuals were normally distributed. This was due to uneven visits and prescriptions from the veterinarian. One month with a high prescription was followed by one month with no antibiotics prescribed. However, since the differences were so big, it was decided to accept the results from the statistical model.

The LSMEANS-estimates and the simple means were relatively close to each other, reflecting that the effect of herd size was relatively small, although significant.

Although candidate and active PurePork herds had a lower use for sows, the difference was small, and not statistically significant. In the program it is allowed to treat sows, but not piglets.

For weaners and finishers, candidate herds had a lower use than herds outside the program. This is not surprising, since herds with a low use before entering the program were selected partly

because of the low use. After entering the program, the use was further reduced in the weaner and finisher period.

Use of antibiotics in the weaner-group was reduced by 78 % compared to non-PurePork-herds and by 64 % in the finisher-group. On average approximately 75 % of the pigs born in the PurePork-program reach slaughter without being treated.

Vaccine-data was obtained from fewer herds than antibiotic use because only herds, that were still active in the program were asked to submit data.

During the period, a new Lawsonia-vaccine and a new coli-vaccine for post-weaning diarrhea was introduced on the Danish market. Comparing production and data on purchase of Lawsonia-vaccines for the PurePork-herds showed, that the proportion of vaccinated pigs in PurePork-herds increased from 32 % in 2017 to 72 % in 2022. For comparison, the proportion of Lawsonia-vaccinated pigs in the total production increased from 6 % in 2017 to 16 % in 2022. Use of coli-vaccines for post-weaning diarrhea increased from 2 % in 2017 to 22 % in 2020 in PurePork-herds and then dropped to 11 % in 2022. In the total production, between 2 and 4 % were vaccinated for annually in the total population.

Most pigs received PCVAD-vaccines both in PurePork herds and in the total production. Sows were in general vaccinated against Clostridial infections, Porcine parvo-virus and erysipelas, often using vaccines, that included coli-vaccination, both in the general population and in the PurePork herds.

Vaccines for Mycoplasma hyopneumoniae and Actinobacillus pleuropneumoniae were often used in PurePork-herds in infected herds. Use of these vaccines is quite common in infected herds in the general population.

For the remaining vaccines, use was infrequent both in the total population and the PurePork-herds.

22 sow herds were active in the program ultimo 2022. 18 had an SPF-status. 16 herds were free from Actinobacillus pleuropneumoniae, 12 were free from PRRS and 6 were free from Mycoplasma hyopneumoniae. This is not markedly different from the average Danish sow herd.

Productivity in a subset of the herds were analyzed by Claus Hansen (1). Table 2 shows the results, compared to the national average.

There were no statistically significant differences in productivity, partly due to the low number of herds in the PurePork-program. However, there was a slightly lower mortality in piglets, a slightly higher mortality in weaners and no difference in the finisher units. Overall productivity in the PurePork herds is comparable to the average productivity.

Table 2. Productivity in Danish pigherds in the PurePork-program and the national average

	PurePork	National average

Number of sow herds in dataset	10	862
Weaned per sow per year	33.4	34.0
Pre-weaning mortality	13.4	15.2
Number of weaner herds in dataset	9	582
Average daily gain in weaners	451	464
Post-weaning mortality	5.1 %	3.9%
Number of finisher herds in dataset	20	985
Average daily gain in finishers	1004	1028
Mortality in finishers	3.6	3.6

Conclusion

Sick pigs must be treated for animal welfare reasons, and because disease can lead to reduced growth and higher mortality, thereby increasing manure and carbon footprint per kg produced, with negative impact on the environment and climate. It is not an option not to treat sick pigs.

Herds under the PurePork program used considerably less antibiotics for weaners and finishers compared to the total production. Prophylactic use and the use of antibiotic growth promoters is not allowed in Denmark. Use in the total production is difficult to compare between countries, but the use in Danish pigs is considered low compared to many other countries with a large pig production.

Productivity in the PurePork-program is comparable to productivity in the total production. But costs are higher due to increased use of vaccines, especially for enteric diseases. Also, other costs are incurred, due to more high-quality feed, improved hygiene and more man-hours needed for supervision.

The fact that approximately one third of the herds either stopped producing pigs in general or left the program indicates, that the production is challenging, but some herds have been part of the program for 7 years, indicating that it is possible to achieve good results.

References

1. Hansen C. BRANCHEANALYSE FOR PRODUKTIVITET I BESÆTNINGER UNDER OUA (OPDRÆTTET UDEN ANTIBIOTIKA – 2021 (Danish text) (Productivity in herds in the PurePork-program) www.svineproduktion.dk.