The influence of immunocastration on carcass lean meat percentage

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Abstract

In most parts of the world, male pigs that are destined for the market are physically castrated soon after birth in order to reduce the risk of boar taint. However, entire male pigs are more feed efficient and deposit less fat than barrows, particularly at heavy slaughter weights. A welfare–friendly alternative to physical castration is immunization against gonadotrophin releasing factor (GnRF), which allows producers to capitalize on the superior growth and carcass characteristics of entire male production without the risk of boar taint. Pigs vaccinated with Improvac showed in different studies less fat, more meat and higher weight of key individual primal cuts than physical castrates.

Immunological castration, Improvac, boar taint, carcass quality, primal cut yields

It is generally known that the castrates of all animals intended for slaughter grow just as fast as non-neutered males and females, but they have a tendency to convert feed into fat component in the body. The proportion of fat in the meat of steers, pigs, castrates and capons is higher than for hormonally active males or females. The decrease in sexual activity is also reflected in their gradual fattening. This effect was used by people for a long time because the production of pigs with a higher proportion of fat was very important for people's nutrition. People did a greater amount of physical activity and had higher energy consumption, especially in winter. Animal fat was a significant energy component of their diet. The farming of animals with a high proportion of fat was therefore necessary and desired. Current eating habits, however, have changed and along with those changes, of course, so have the consumer's view on the quality of meat. Meat is first and foremost a source of protein. Demand for animal fats has fallen significantly and continues to fall. Customers are interested in lean meat, so there has also been a decline the amount of fat in meat products. Fat in meat has primarily become a culinary question - fullness of taste, the juiciness of cooked meat. Nowadays, the role of meat as an energy source is of secondary consideration, where even pork is criticized for its high fat content - especially of saturated fatty acids which have an impact on the onset of cardiovascular diseases. The production of lean meat with excellent sensory properties has clearly moved to the fore and it is to be expected that consumers will further encourage this trend. From a nutritional point of view, "modern" high quality pork is just as good as poultry. It is evaluated even higher in terms of its sensory properties. It is realistic to state that the pressure on quality will soon show itself in the reduction of pig slaughter weight and possibly even in the selection of sexes among pigs for slaughter, in the quest for a solution that would eliminate the castration of male pigs.

The current production of pigs for slaughter is under unprecedented economic pressure. Only those breeders can succeed who keep pace not only against their competitors in a given country, but globally as well. Pork has become a commodity that is traded globally and the deciding factors are, just as in other areas of trade, price and quality. The differences in the two parameters, however, are such that may cause problems for a number of not only small but also medium-sized and large producers: falling behind in any aspect of

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quality or having its production costs even marginally higher than competitors over an extended period of time may result in firms going bankrupt. The decrease in the production of animals for slaughter in the Czech Republic is alarming. The response to market needs comes completely through imports of meat and, more recently, through imports of live animals to utilize slaughter house capacity. New breakthroughs are no longer being looked for in the breeding of pigs. Focus has rather been on the implementation of theoretical assumptions in practice. Details previously thought insignificant are being looked into and every penny counts, because that may be what will decide whether the firm, be it a farm, slaughter house, meat processor or a trader, ends up in the red or in the black. From an outside view, refusing any innovations that move development forward while increasing competitiveness is of course silly. From the perspective of interested parties, however, each step requires very good theoretical preparation, detailed analyses and plans – as is the case in the area of the castration of pigs for slaughter.

The Improvac vaccine from Pfizer Ltd. against the boar taint is being successfully used in a number of countries (currently 62). Australia has been using it for 12 years. As of May 2009, the vaccine has also been registered in the EU and is therefore available to Czech pig farms as well. The vaccine for boars temporarily reduces the testicular functions, thereby reducing the concentration of androsterone and skatole to a level common in castrated males and gilts. Time constraints for applying the vaccine require that the decrease in the concentration of odor substances be well synchronized with the date of intended slaughter. The vaccine is applied in two doses at a minimum interval of 4 weeks. Pigs can be vaccinated from the age of 8 weeks; the second dose should be administered four to ten weeks before the estimated time of slaughter. From the first application of the Improcac vaccine until the second application of the vaccine, the male pigs can develop as normal males. For most of their growth period they may benefit from natural higher male growth capabilities. Studies comparing the vaccination against boar taint with surgical castration usually point to an improvement in feed conversion by 8-10%, which is a key criterion for the economics of pig farming. Vaccinated male pigs usually have less fat, and about 0.9% to 3% higher lean muscle content than surgically castrated animals. Farmers also find it very interesting that there is a reduction in mortality in vaccinated pigs due to the prevention of post-castration infection by an average of 1.6% according to European studies. But what is the reality in practice? How does the vaccination manifest itself in the composition of the pigs?

Carcass lean meat percentage

The lean meat % of pigs for slaughter is, of course, most affected by the genetic potential of the animal and the quality of nutrition. The influence of immunocastration on the overall lean meat % of male pigs has been studied in countries around the world. In the vast majority of studies, the theoretically expected increase in lean meat % was proven, and on average by 3.8%. Differences, however, are significantly affected by breeds, that are geographically, and we will therefore provide comparison data from European studies that are closest to us. The results listed in Table 1 are mean values in lean meat percentage. The improvement shown in field experiments on Czech farms was 1.9% on average, with a variation of 0.65% to 2.71%. In any event,

Table 1. Average lean meat % of pigs in selected EU countries (Pejsak Z et al., Pfizer Study no 9322C-53-05-209 Denmark, 9320R-12-07-257 France, 9320R-50-07-261 Netherlands)

	Castrates	Improvac	Difference
Czech Republic	55.6	57.3	+ 1.7
Hungary	53.4	56.0	+ 2.6
Poland	55.3	56.2	+ 0.9
Netherlands	56.5	57.8	+ 1,3
France	58.3	59.5	+ 1.2
Denmark	58.3	59.1	+ 0.8

the increased cost of immunocastration, which is higher than classical surgical castration, was covered by improved lean meat %.

Belly lean meat percentage

The pig lean meat % assessment is based on the correlation of the back fat thickness to the diameter of the loin. Traders, meat processors and slaughterhouse operators, however, have been pointing out the significant differences in the fattiness of pig bellies from Czech breeds for several years. The quality - leanness - of pork bellies in our country has been a long-term problem. In the final calculation of carcass yields, the quality and price of bellies start to play a significant role. When determining their price, it is common that belly lean meat % is a fundamental criterion, which had been highly neglected in our country several years ago. A higher slaughter weight than that of surrounding countries provides us in pigs with good lean meat %, with a high weight of the valuable cuts (loins, ham), but also a higher fat cover on the bellies. Studies of the influence of vaccination on the leanness of belly meat have been carried out in a number of countries. The results of the studies carried out in Germany are given here as an example. In Table 2, you can see the potential that male pigs have in regards to the weight of the belly in comparison to castrated pigs, as well as the shift caused by the Improvac vaccine.

Table 2. Differences in belly lean meat % of male pigs (Pfizer Study no 9125C-10-05-203 Klifovet)

	Castrates	Improvac	Males
Belly weight (kg)	16.1	15.5	15.0
% of belly muscle	48.7	52.5	53.0

Table 3. The differences in the pig´s composition in relation to the quality of bellies (Fuchs T et al.)

	Castrates	Improvac
Thickness of back fat (mm)	17.3	15.6
% of lean meat	53.8	54.8
Belly weight (kg)	14.6	14.1
% of belly muscle	50.5	52.6

In Table 3 a significant decrease can be seen in the thickness of the back fat in immunized males with regard to castrates and a higher lean meat%. The increased leanness of the belly was also higher than the overall increased leanness of the whole carcass. A point of interest for the Czech environment is that the slaughtered pigs in the German study had a higher weight (115 kg and 128 kg), which is quite similar to the situation here at home. The decrease in the belly yield was reflected only in the decline in the proportion of fat. The total belly weight fell by 3.7% and the proportion of lean parts increased by 3.8%. Also very promising is the growth potential with respect to male pigs – 0.7%. Similar results may be observed from Table 3, where belly weight decreased when using Improvac by 3.4%, but the leanness of the belly still has potential for growth, increased by 2.1%.

In Belgium the pork bellies of 2 600 pigs were classified into 4 groups. Thirty percent of the bellies of castrate males were classified in the worst group called „fat“. There was a significant qualitative shift during immunocastration. Not a single belly was classified in this worst group. The percentage of lean meat between castrates and immunized male pigs increased by 1.2% (from 60.6% to 61.8%).

Ham yields

In Spain, the focus was on monitoring the parameters of the hams, which are a very valuable commodity for the production of dried ham. The hams were separated and cut into lean muscle, subcutaneous fat, intramuscular fat and bones. It was shown that vaccinated male pigs had a significantly higher lean meat percentage and lower percentage of

Table 4. Yield of hams from various slaughtered pigs (Pfizer no 31203 – IRTA)

	Castrates	Improvac	Male pigs	Gilts
% of muscle	65.55	69.29	73.05	70.45
% of surface fat of hams	21.32	17.46	13.33	16.96
% intramuscular fat	5.32	5.20	4.69	4.69
% of bones	7.81	8.05	8.93	7.90

subcutaneous fat when compared to physically castrated pigs. The quality of the hams of the male pigs resembled more the hams of gilts. The yield of hams is listed in Table 4.

It is being proven that the growth potential of immunocastrated pigs is so high that it is necessary to adjust and optimize their feed composition. A study carried out at the University of Illinois in the United States, which assessed various parameters when increasing levels of lysine, showed that increased levels of lysine not only increased the quality of the carcass, but also the meat content in the valuable parts. The findings have been summarized in Table 5. The stimulating effects of lysine in the feed of pigs on the development of muscle groups are known and the potential for further growth in immunocastrated pigs is conclusive. It will, of course, be necessary to carry out economic calculations.

Table 5. The carcass yield of market pigs fed various levels of lysine in their feed rations (Boller D. et al.)

	Castrates	Improvac	Male pigs		
LYSINE LEVEL	low	low	medium	high	high
% of lean meat	53.77	56.11	57.57	59.84	64.23
% of meat in valuable cuts	61.51	62.73	64.08	64.01	66.09
yield of a carcass half %	73.70	74.28	76.12	76.33	77.87

In the short term, it is not probable that the Czech Republic will opt for non-castrated pigs with low slaughter weight. The slight boar taint is relatively frequent even in these sexually immature male pigs and Czech customers are sensitive to it. In addition, from an economic point of view, it is a pity not to take advantage of several more days of high growth potential of animals weighing about 100 kg. It shall not, however, be converted to the formation of fat. In order to keep pace with continually higher worldwide pressure for lean pork, we will have to rely on the castration of male pigs until genetic selection or another yet unknown solution is figured out. Meanwhile, pressure for a nonsurgical solution to the problem continues to grow within EU countries. A declaration issued at the meeting of representatives of farmers, the meat industry, traders, veterinarians, and scientists in Brussels at the end of 2010 is clear: from 2018 surgical castration should be completely banned. Of course, making this a reality depends primarily on the progress and results of the legislative process in the EC of the EU. The situation may, however, also radically change under the pressure of non-governmental animal rights organizations and the like. The Belgian business chain Colruyt was the first in Europe to decide to use the media to take advantage of public sensitivities to animal welfare and to buy pork only from non-castrated animals – gilts and Improvac vaccinated male pigs. Customer surveys indicate a preference for this meat.

At the end of 2011 in the Czech Republic, the Improvac vaccine was used at 20 swine farms and about 70 thousand vaccinated male pigs were slaughtered at 16 slaughterhouses. It shows that we are not lagging behind current developments in Europe, and many of us have already had our first practical experience. The vaccine is successfully used primarily on repopulated farms. These are pig farms that have had a complete change in their animal population over the last two years – primarily changed for the Danish hybrid lines. The results from these breeds are excellent. The number of animals delivered to slaughterhouses from one sow per year reaches 27 pigs. These animals are regularly ranked

to the top classification categories. The state of health of both individual pigs and pig populations is greatly above-standard. The consumption of antibiotics for treatment has decreased to one quarter during the whole production process. In order to improve already excellent economic results of the farms, the Improvac vaccine against boar taint has also been introduced.

For pig breeders, last year was of course economically unfavorable and pressure was again increased on all reserves and on reducing costs of the entire process. For many of the breeders it was a liquidation year, and many understood that the decisive factor for success may not be a high selling price for slaughter animals oscillating above the break-even point of often below-average businesses, but a minimization of production costs – the day-to-day implementation of many details whose aggregate effect will provide the desired profits even in times of deep price depression. But that is, after all, true of all business sectors.

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