Comparison of ultrasonic equipments in pig production

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Abstract

Goal of the research work was to compare pig meat characteristics taken by ultrasonic equipments Piglog 105, Ultra-FOM 100 and A-Scan Plus. 55 pigs from different breeds, coming from 9 different farms in Estonia were tested. Backfat thickness at last rib – x1, diameter of loin eye – x2, backfat thickness at 10^{th} rib – x3 and lean meat content - y on live pigs and carcasses were measured. Significant differences between A-Scan Plus and other equipments were found. As results of equipments of SFK Tehnology and A-Scan Plus differ in large scale it is important to find out reasons which affect the results of ultrasonic scanning. One of the main reasons, which should be taken under observation, is human factor.

Introduction

Ultrasonic probes have been used since 1994 to measure backfat depth on pigs for use in pig improvement program in Estonia. At present there are lot of discussions about objective concerning these probes. Since both equipments are authorized and produced by SFK Tehnology, Denmark, it was necessary to compare results of these equipments with measurements from other ultrasonic instrument.

Material and Methods

All pigs were kept in similar conditions in Kehtna Swine Testing Station in 1998-1999. 55 pigs from different breeds, coming from 9 different farms in Estonia, were reared in a test station from 25 to 105 kg before going to slaughter. Pigs were tested on farm on previous day of slaughtering – weight, meat traits with Piglog 105 and A-Scan Plus (USA). On slaughter day carcasses were evaluated with Ultra-FOM 100 in Valga Meat and Canning Industry. Backfat thickness at last rib – x1, diameter of loin eye – x2, backfat thickness at 10^{th} rib – x3, lean meat content - y on live pigs and carcasses were measured (Figure 1).

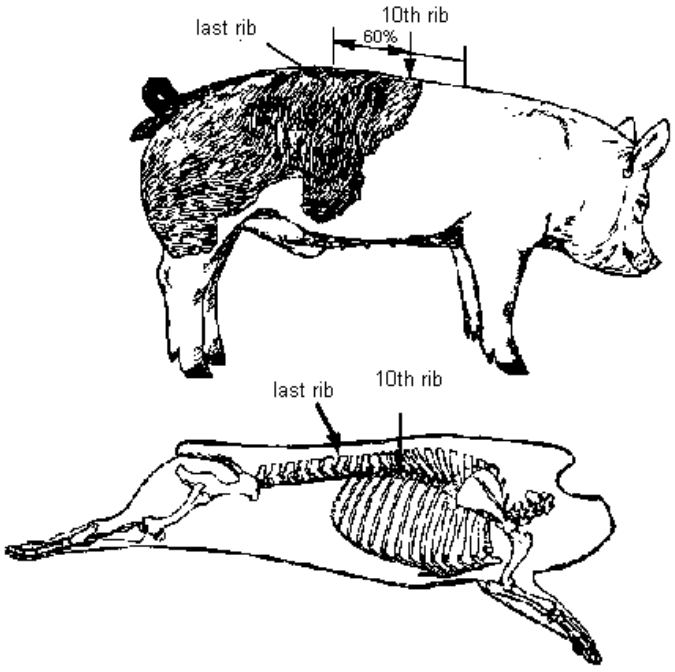

Figure 1. Points to measure backfat

The following model was used to calculate lean meat content:

$$y=64.39-0.28*x1+0.14*x2-0.55*x3$$

The General Linear Model (GLM) procedure (SAS Inst. Inc., 1991) was used for analysing the dataset by analyses of variance. The following statistical model was used:

$$Y_{ijk}=\mu+B_i+F_j+b*Wt_{ijk}+e_{ijk},$$

Y= dependent variable;
μ = general mean;
B_i = effect of boar, i=1,...,15;
F_j = effect of factor (F_1 = 'Piglog' 105, F_2 = 'Ultra-FOM', F_3 = 'A-Scan Plus') j = 1, 2, 3;
Wt_{ijk} = effect of pig weight at testing;
b = regression coefficient;
e_{ijk} = random error.

The results are given as least-square means (Parring, A-M. et al., 1997). Level of significances expressed conventionally: #: P<.10, *: P<.05, **: P<.01, ***: P<.001 and a, b, c – least square, within each effect with one letter in common do not differ significantly.

Results and Discussion

According to results of Agricultural Registers and Information Centre we have not made considerable progress in reducing backfat, but lean meat content is well increased (Eesti ..., 1998).

To compare backfat results of Piglog 105, Ultra-FOM and carcass measurements we can't find any big differences (Table 1). Backfat measurements taken from carcass were between results taken by Ultra-FOM and Piglog. So with these equipments we can quit correctly predict backfat depth. Backfat measurements taken with A-Scan Plus stay significantly below the results of Piglog and Ultra-FOM (P<.001).

Diameters of loin eye differ significantly between all three equipments. Larger diameter of loin eye was found with A-Scan Plus and lower with Piglog 105 (9.32 mm). As muscle can change its diameter in large scale, it is very difficult to get reliable results in live pigs.

Table 1. Differences between meat characteristics

Testing points	Ultra-FOM 100	Piglog 105	A-Scan Plus	Mean backfat depth by rule
x1	18.44^a	18.08^a	15.95^b	18.26^a
x2	50.60^a	46.92^b	56.24^c	-
x3	18.83^a	17.63^a	14.50^c	18.14^a
Y	55.89^a	55.99^a	59.72^b	-

Significantly higher lean meat content showed probe A-Scan Plus, as 4% lower results were found with Ultra-FOM and Piglog 105.

To get better overview about relationships between diameter of loin eye and area of loin eye, results of correlation analyses are presented in Table 2. Higher correlation were found between measurements of Piglog 105 and area of loin eye ($.246^{\#}$).

Table 2. Correlations between loin eye, measured with different equipments

Traits	Ultra-FOM 100	Piglog 105	A-Scan Plus
Loin eye area by planimeter	.021	.246#	.094
A-Scan Plus	.017	-.007	
Piglog 105	.022		

As results of equipments of SFK Tehnology and A-Scan Plus differ in large scale it is important to find out reasons which affect the results of ultrasonic scanning. One of the main reasons, which should be taken under observation, is human factor.

References

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Сравнение ультразвуковых измерительных аппаратов в свиноводстве

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Задачей исследовательской работы было сравнить показатели свинного мяса, полученные с помощью ультразвуковых аппаратов Piglog 105, Ultra-FOM 100 и A-Scan Plus. Были протестированы 55 свиней разных пород из 9 хозяйств по всей Эстонии. Измерялись следуующие показатели:

- толщина шпика у последнего ребра - x1,
- диаметр глазка мышцы - x2,
- толщина шпика у 10-го ребра - x3,
- содержание постного мяса в тушах - y.

Значительное отличие наблюдалось между показателями A-Scan Plus и других измерительных приборов. Так как показатели измерительных приборов отличались значительно, то необходимо найти причины, влияющие на результаты измерений ультразвуком. Одной из основных причин, достойной дальнейшего изучения, является человеческий фактор.