COMMUNICATION

Fixed effects in models for the genetic evaluation of backfat thickness and time on test in gilts

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ABSTRACT - Fixed effects in the model for backfat thickness and the time on test were evaluated. Data records from large scale farm in period from January 1998 to December 2007 were analyzed. Two models were developed. Fixed effects of genotype, season and weight were included in the model for backfat thickness. The model for time on test was simpler than model for backfat thickness, containing only fixed effects of genotype and season. Choice of the model was based on coefficient of regression and degrees of freedom. The model for backfat thickness explained 56% of the variability, while the model for time on test explained 65% of variability. The results of this investigation will be useful in future development of the model for prediction of breeding values for gilts in field test.

Key words: Pigs, Modelling, Gilts, Field test.

Introduction – Field test presents the basis for selection of gilts for production traits in Croatia (Vincek *et al*., 2003). Selection of the gilts in Croatia was based on economical indexes, while in last few years selection is based on best linear unbiased predictors (Vincek, *et al.*, 2004). Countries around the world use different models and effects to fit the data. Effects like genotype, sex, season, body weight, herd-year-season interaction, interaction between genotype and season, interaction between weight and genotype are usually applied in the models for field test traits. Specific production conditions in Croatia require the determination of appropriate effects in the statistical model for backfat thickness and time on test prediction. Choice of the effects in model is critical for development of statistical models, to be used for prediction of breeding values (Satoh *et al*., 2002; Gorjanc *et al*, 2001).

Material and methods – Data records for gilts were provided by Croatian livestock centre in the period between January 1998 and December 2007 for one large scale farm. Raw data contained 17,303 records. 1856 data records were excluded due to non-logical values, as well as extreme data records. Only gilts weighting from 80 to 120kg were included in analysis. After data editing, 15,447 records were analyzed. Traits measured in the field test of

Table 1. Effect of sow genotype on backfat thickness and time on test (LS means ±SE).

Genotype	Backfat thickness, mm	Time on test, days
Swedish Landrace	11.3±0.03^{A}	192.8±0.24^{A}
Large White	12.1±0.03^{D}	193.6±0.22^{A}
German Landrace	11.6±0.04^{B}	193.0±0.33^{A}
Large White x Swedish Landrace	11.8±0.03^{C}	193.9±0.24^{B}
Swedish landrace x Large White	11.9±0.03^{C}	193.9±0.23^{B}

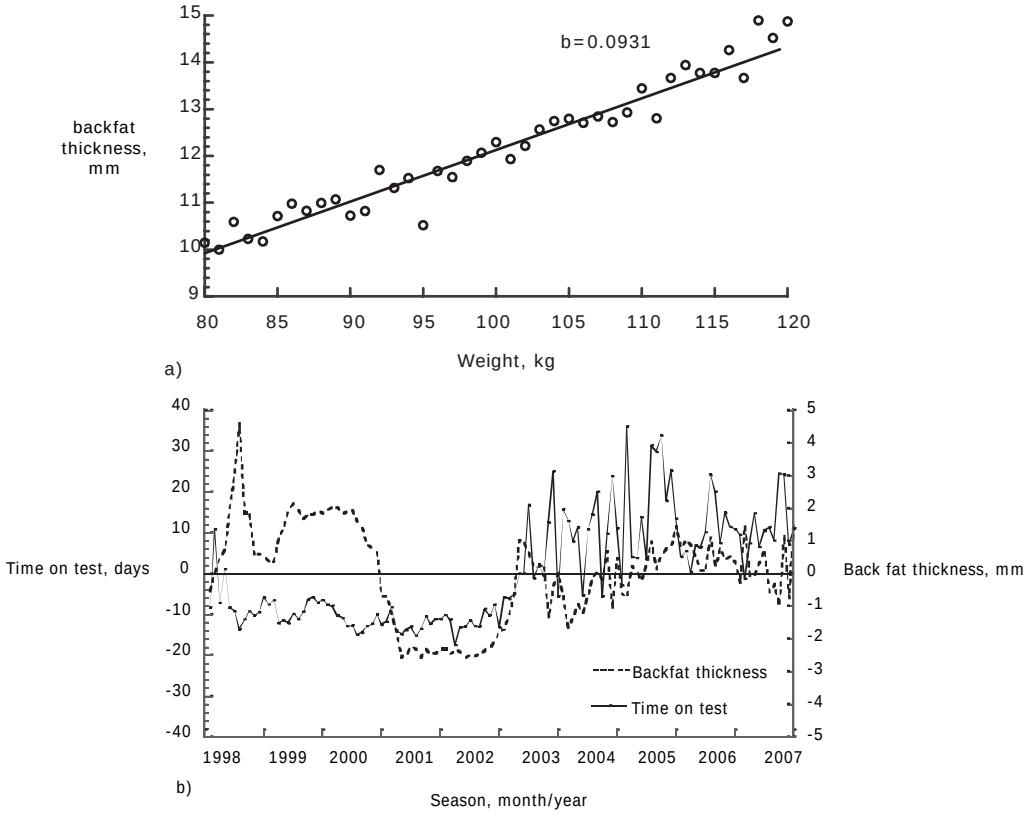
A, B, C and D within column means differences between LS means for P<0.01.

gilts were backfat thickness (BF) and time on test (TT). Time on test presents number of days in performance test for gilts from 30 to approximately 100kg. Genotype and season were defined as class effects, while weight at the end of the test was defined as linear regression. Five genotypes were included in investigation: Swedish Landrace (SL), Large White (LW), German Landrace (GL), Large White♂ x Swedish Landrace♀ (LWxSL) and Swedish Landrace♂ x Large White♀ (SLxLW). Season was defined as combined effect year-month. There were totally 120 levels for ten years. Procedures MEANS and GLM (SAS, 2004) were used for statistical analyses; a comparison among all LSMEANS was made using the pdiff option and the sheffè adjustment method. Model development was started by testing single effects of genotype and season for both traits and weight only for backfat thickness, and combining effects mutually. The most complete were final models for both traits. The choice of the model and effects was based on coefficient of determination (R^2) and degrees of freedom (DF), considered for model and effects separately.

Results and conclusions – Different models for BF and TT were tested. A comparison among models based on coefficient of determination and degrees of freedom showed that following models could be used for traits observed: a model with effects of genotype, season and weight for backfat thickness, and a model with effects of genotype and season for time on test. The valves, models,were value of R^2 in model for backfat thickness and time on test was estimated to be 0.56 and 0.65, respectively. The LW gilts had the highest value for BF, while SL had the lowest value (Table 1). Genotypes included in the analysis were maternal breeds, mainly used in Croatian pig breeding program. There is significant statistical difference in BF among all purebreds ($P<0.05$), as well as difference among purebreeds and crossbreeds, but those differences have no practical meaning. The SL gilts stayed shorter in test than other genotypes. Regression of weight to BF showed that prolongation of test for 10 days increased BF for approximately 1mm (Figure 1a). Results indicate that season had a large effect on BF. This can be explained by climate changes within year, but also by changes caused by genetic improvement. Variability in BF caused by season effect could be also explained by changes of production conditions. Season had also strong effect on TT. Except for seasonal changes within year, it was obvious that increasing trend of TT has existed since year 2004 (Figure 1b). Increasing trend is probably a result of poor genetic basis and possible unfavourable changes in technology.

It can be concluded that all above mentioned effects due to their obvious importance should be included in the model for prediction of breeding values of gilts on field test.

Figure 1. Effect of weight on backfat thickness (a) and effect of season on backfat thickness and time on test (b).



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