Economic values for lean meat- and fat efficiency in the Norwegian Landrace nucleus pig population

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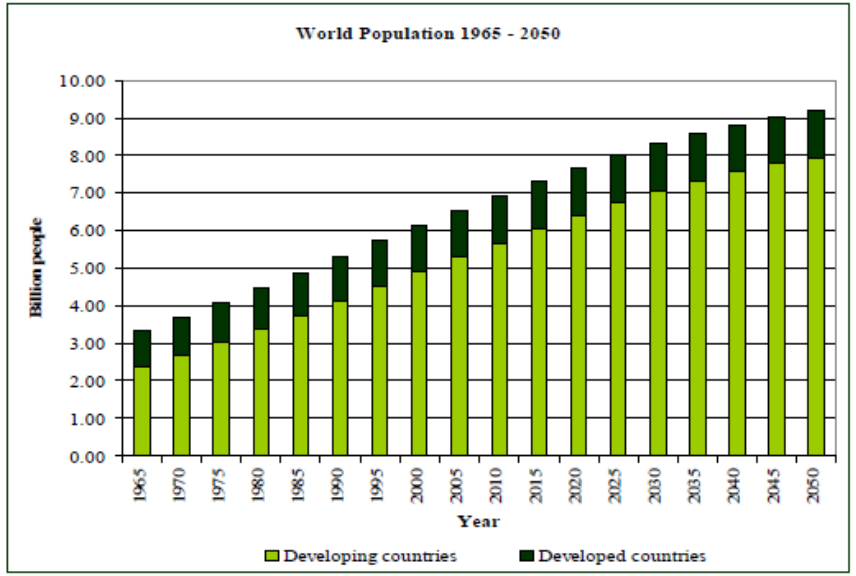
BACKGROUND

- Human population growth:
  - Demands increased food production
  - High competition for feed resources

- Economy in pork production

- Important goal for future genetic improvements in animal breeding.



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2007)

New feed efficiency measure

- Developed a new measure for feed efficiency

- Random regression of lean meat and fat content assessed by CT

    - Fat efficiency, feed/kg fat
    - Lean meat efficiency, feed/kg lean meat

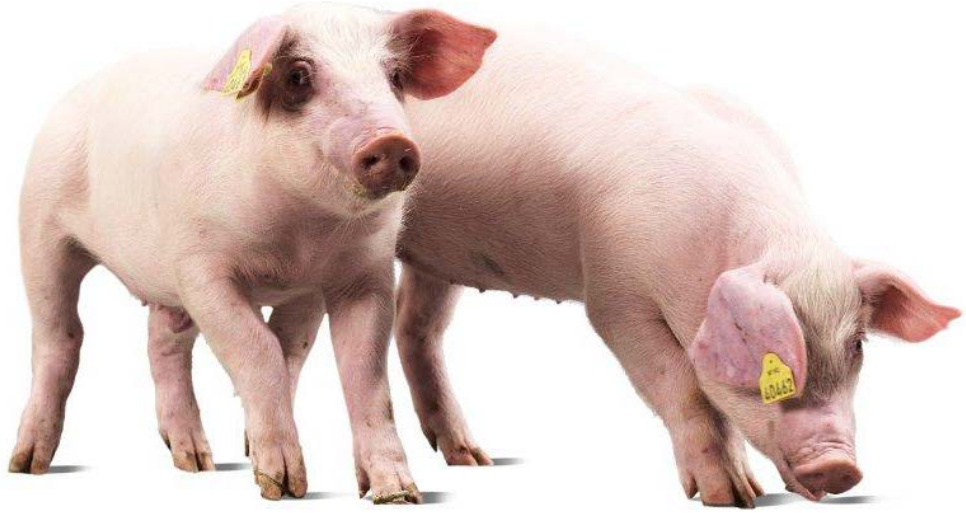
GENETIC PARAMETERS

- Genetic variation existed

- Few unfavorable correlations to important sow traits
  - Stayability in sows and fat efficiency
  - Total litter weight at three weeks and fat efficiency

Objective

Calculate economic values for lean meat efficiency and fat efficiency in Norwegian Landrace.



Economic model

- A simple economic model
    - Performance level was set to the production mean from the test station.
    - Estimated production and profit per fattening pig

Traits

- Days from 40 to 120 kg live weight
- Lean meat efficiency
- Fat efficiency
- Lean meat percentage
- Fat content of the carcass
- Total feed intake in the test period (40-120 kg)

Profit function

- Profit (P) = income – costs

- Income:

Photo: Bondebladet

Price/kg carcass

Carcass weight

Lean meat percentage

$$\text{Income} = CW \times (Pr + (LMP - 60) \times AdPr) + S$$

Bonus/reduction if LMP` 60%

Subsidies

Profit function

- Costs:
    1. Feed (efficiency measurements were used)
    2. Labor
    3. Buildings/machines
    4. Fixed costs

Photo: Felleskjøpet Rogaland Agder

Economic values

$$\text{Marginal economic value}_n\text{(MEV)} = \frac{P(\mu_n + \Delta n) - P(\mu_n)}{\Delta n}$$

For trait *n,* the marginal economic value was the change in profit when trait *n* was improved by 1% divided by the change in the trait (• n).

To compare the economic values across traits, they were expressed per genetic standard deviation ($\tilde{A}_a$)

$$\text{Standardized EV} = \text{MEV} \times \sigma_a$$

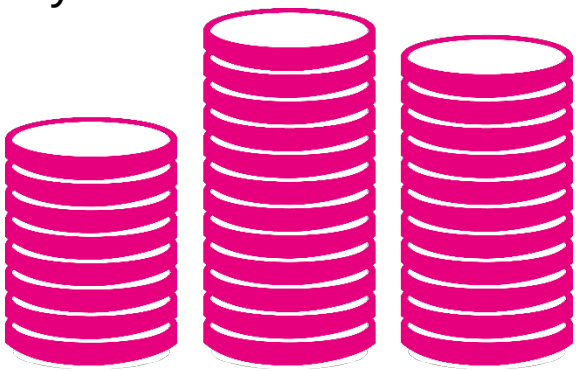


Photo: Topigs Norsvin

Results

TRAIT	MEV(€)	σ_a	SEV(€/σ_a)
Total feed intake in the test(kg)	0.3	4.7	1.6
Lean meat efficiency (kg feed/kg lean meat	18.3	0.5	8.9
Fat efficiency (kg feed/kg fat)	5.6	0.5	2.9
Days in the test (days)	0.9	2.8	2.6
Lean meat percentage	2.5	1.8	4.5
Fat content carcass (kg)	0.8	1.4	1.1

Indexes and breeding goals

$$\mathbf{Index}_{ij} = \sum \mathbf{MEV}_i \times \mathbf{EBV}_{ij}$$

$$\mathbf{PROFIT}_j = \sum \mathbf{MEV}_i \times \mathbf{phenotype}_{ij}$$

Breeding goal A

- Lean meat- and fat efficiency for estimating feed consumption
- $\tilde{A}_i = 54.9$

Breeding goal B

- Total feed intake in the test period as feed consumption trait
- $\tilde{A}_i = 32.6$

EBV's for PROFIT

- Economically weighted phenotype including the traits in breeding goal B
- $\tilde{A}_{EBVprofit} = 23.2$

Rank correlation between the indexes = 0.77

Conclusions

- Lean meat and fat efficiency had high economic importance in pork production
- There was larger variation in the index including the new traits compared to the traditional trait.
- Low rank correlation between the indexes suggested that the two efficiency traits contribute with additional information to the genetic evaluation in boars.

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