Genetic trends for production and nonproduction traits in Simmental breed in Slovenia

University of Ljubljana, Biotechnical Faculty, Department of Animal Science, Slovenia

Klemen Potočnik, Jurij Krsnik and Miran Štepec
Slovenian Simmental breed

* Population ~ 245 000 animals
  ~ 104 000 cows
  ~ 35 000 herds
  ~ 54 000 cows in milk control (20 t BSW, 32 t HOL, 5 t Other)

* Milk production
  ~ 5 380 kg milk
  ~ 4.24 % fat
  ~ 3.37 % protein
Breeding Program

**COW POPULATION**
- Recorded Cows:
  - Pedigree, Production, Conformation, BV(Milk, Conformation and Fertility)

**BULL DAMS**
- Bulls in performance test:
  - Daily gain, Conformation, BV(Milk, Conformation and Fertility)

**PROGENY TESTING**
- Assessment: ♂♀ C.E., Con., Gen. Def.
- Growth & Carcass: ♂ Dual p. & Beef
- Conformation traits: ♀ 1st calving
- Milk prod. & Rep.: ♀ Dual p. & Milk

BV – Breeding goal

**AI Sires**

**Elite Sires**

AI → IC

Natural mating

Slaughter
Economical view of traits

* Production
  ~ Milk traits
  ~ Growth and carcass traits

* Nonproduction
  ~ Fertility traits
  ~ Conformation traits
  ~ Other traits

* Indexes
  ~ IFP
  ~ Index of conformation traits
  ~ Total merit index
Material

* Results of routine breeding value estimation
  ~ Simmental population
  ~ April 2007 evaluation

* Traits
  ~ Milk production
  ~ Fertility
  ~ Conformation
  ~ Indexes
Breeding value evaluation

* Data
  ~ Traits
  ~ Effects
  ~ Relationship structure

* MME
  ~ Estimation of dispersion parameters
  ~ BLUE and BLUP
  ~ Standardization of BV (GB) \( BV_{12} = BV / SD_{BV} \times 12 + 100 \)
  ~ Indexes
Estimation of BV for TD Milk traits

* Repeatability animal model
* Calving since 1997 (only first 5 lactation)
* Model including:
  ~ Birth and Calving season, Days in milk and Parity
  ~ Herd, PE, additive genetic effect
  ~ Pedigree information, genetic groups
* Expression of BV:
  ~ EBV-base=cows born in 1995; RBV-BV12
Dispersion parameters - Milk production
Genetic changes - Milk production

[Graph showing changes in milk production traits over time]
Estimation of BV for Fertility traits

* Animal model (CI$^1$ and Age at 1$^{st}$ calving$^2$)

Model including:

∼ Calving season, Parity*Milk yield$^1$, Birth year$^2$

∼ Herd, additive genetic effect

∼ Pedigree information, genetic groups

* Expression of BV:

∼ EBV-base=cows born in 1995; RBV-BV12
Dispersion parameters - Fertility
Genetic changes - Fertility
Estimation of BV for Conformation traits

* Multi Trait Animal model
* Scoring since 1989 (only 1st calving cows)
* Model including:
  ~ Expert*year of scoring, Calving season, Age, DIM
  ~ Herd, additive genetic effect
  ~ Pedigree information, genetic groups
* Expression of BV:
  ~ EBV-base=cows born in 1995; RBV-BV12
Dispersion parameters - Stature
Genetic changes - Stature
Dispersion parameters - Form
Genetic changes - Form

Form Traits
- Form
- Rear Leg
- Pasterns
- Hoof Height
- Rump Angle

Standardised BV

Birth Year

Dispersion parameters - Udder
Genetic changes - Udder

[Graph showing changes in Udder traits over birth years from 1990 to 2004]
Dispersion parameters - Teat
Genetic changes - Teat

![Graph showing changes in teat traits over birth years]
Total Merit Index – Milk production

- Udder: 17%
- Form: 10%
- Stature: 10%
- Calving easy: 5%
- Fertility: 10%
- Milking speed: 3%
- Milk traits: 35%
- Daily gain: 5%
- Muscularity: 5%
Total Merit Index – Dual purpose

- Daily gain: 20%
- Muscularity: 18%
- Udder: 5%
- Form: 10%
- Milk traits: 9%
- Fertility: 10%
- Calving easy: 9%
- Stature: 19%
Genetic trend - Indexes

![Graph showing genetic trend in indexes over birth years.](image-url)
Conclusion

* Simmental breed in Slovenia was made in last 14 year quite large genetic progress especially for milk production and udder traits.
* Because of genetic progress in milk production, we expect negative effect in beef and carcass traits
* In the future we will also study genetic changes for longevity, calving easy, udder health traits.