Can mate selection help to cope with inbreeding in Polish Holstein-Friesian cattle?

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Introduction

Polish Holstein-Friesian cattle:

• Relatively low inbreeding level of 2,7% for the youngest animals

• Very high rate of inbreeding increase: 0,23% per year !!!

Goal

To investigate whether optimized mating can reduce inbreeding without cost of smaller genetic gain.

Material

31 bulls from local AI company

90 randomly selected herds

2501 Polish Holstein-Friesian cows

Methods

Breeding goal: maximize selection of the production index traits (official up to early 2007).

Mate selection approach (Kinghorn i Shepherd 1994) including linear programming to minimize inbreeding.

5 mating strategies were compared:

• Random mating

• Maximizing index only - breeding values for production traits (no restrictions on inbreeding)

• Minimizing inbreeding only (breeding values not taken into account)

• Optimization MODEL 1

  • Maximizing index

  • Maximum individual inbreeding: 5.0

  • Maximum average inbreeding in future offsprings: 1.8

• Optimization MODEL 2

  • Maximizing index

  • Inbreeding accounted by inbreeding depression for traits included in the index.

Breeding values and inbreeding for various mating strategies
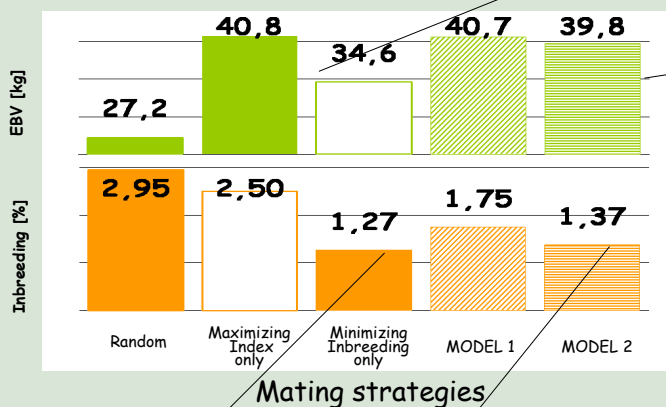
Maximum gain ignoring inbreeding & Gain for the best optimization model

Inbreeding for the best optimization model is only slightly higher than the lowest possible

With optimized mating using mate selection approach you pay only 0.25% of genetic gain to efficiently reduce inbreeding from 2.95 to 1.37!