

SLOVAK BREEDING SERVICES
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GENETICS
the basement of the profitable herd

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Some figures to know who we are:

- More than 350 000 inseminations in year 2006
- 70 000 doses of bovine semen exported to Germany, Austria, Turkey, Mongolia and Kazakhstan
- 75 % share in domestic market
- 36 bulls in young sire program yearly
- holder of 6 awards "Champion of Agra -Fair Nitra" and "Golden Sickle 2002" for exhibited bulls
- successful realization of cattle genetics improvement projects in Mongolia, Kazakhstan

Activities :

- realization of domestic breeding programs (Holstein, Fleckvieh, Pinzgau)
- contribution in young sires international programs
- international cattle genetics sale
- artificial insemination service






Basic Genetics

Trait = Genetics + Environment

Phenotype = Genetic + Environment Potential Influences

P = G + E



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Dairy Cattle Breeder Tools


- Selection
 - Picking the animals that will be parents of the next generation
- Mating
 - Matching cows and bulls
- Culling
 - Eliminating undesirable individuals from the population
 - Actually influences selection



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Selection

- Picking the parents of the next generation
 - Not much selection done on the maternal side
- Increase frequency of "good" genes in population
- Influenced by:
 - Genetic Variation
 - Accuracy of Selection
 - Intensity of selection
 - Number of traits selecting for
 - Generation Interval

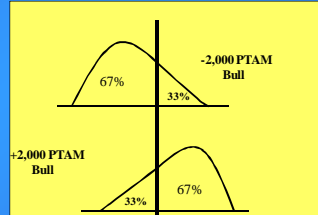


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Understanding Genetic Expression

The most most important thing to remember is:

- The poorest bull will have some good daughters.
- The best bull will have some poor daughters.



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HERITABILITY OF TYPE TRAITS

- It is difficult to make much genetic progress through selection and mating unless a trait has a heritability of .10 or higher.


HERITABILITIES					
Trait	h ²	Trait	h ²	Trait	h ²
Stature	0.4	Rear Legs - Side View	0.2	Rear Udder Width	0.2
Strength	0.3	Rear Legs - Rear View	0.1	Udder Cleft	0.2
Body Depth	0.4	Foot Angle	0.2	Udder Depth	0.3
Dairy Form	0.3	Feet & Legs Score	0.2	Front Teat Placement	0.3
Rump Angle	0.3	Fore Attachment	0.3	Teat Length	0.3
Thurl Width	0.3	Rear Udder Height	0.3	Final Score	0.3



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THREE CATEGORIES OF DATA THAT CAN IMPACT A MATING DECISION

- Ø THE COW'S PERFORMANCE (*phenotype*)
- Ø THE COW'S PEDIGREE (*genotype*)
- Ø ENVIRONMENT and OTHER FACTORS



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Selection for too much dairyness




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Factors to Consider

- Economic Value
 - Does it have a value??
 - Will it improve profitability??
- Heritability
 - How fast can this trait change?
 - Genetic control vs. environmental or management control
 - Heritability is 100% if expression of trait varies solely because of inheritance
 - Genetic variation/(genetics + environment)= h²
 - Reduce management or environmental variation in population, heritability increases



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Traits of Importance


- Milk
- Health or SCS
- Reproduction
- Type traits
 - Udder composite
 - Feet and legs composite
 - Stature (big or small????)
- Calving Ease



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TYPICAL HERITABILITY ESTIMATES -

	LOW	Calving interval	.05
		Female fertility	.04
	MED	Milk yield	.35
	HIGH	Butterfat %	.55



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SELECTION PRESSURE

Selection Pressure


Number of independent Traits	Relative Improvement for Milk
1 (Milk Prod.)	100%
2 (Milk Prod. + % Fat)	71%
3 (Milk Prod. + % Fat + Udder)	58%
4 (Milk Prod. + % Fat + Udder + Legs)	50%



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Population Gene Flow

- 76% by bull studs
 - Sires to sons – 43%
 - Cows to sons – 33%
- 24% by producers
 - Sires to daughters – 18%
 - Cows to daughters – 6%
- ~ 9 million cows, ~ 600 bulls




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Genetic Progress

50% from sire, 50% from dam

- Sire choices – best in the world
- Dam choices – best in the herd
 - after culling and replacement losses
 - involuntary culling rate (mastitis, reproduction, mastitis, death losses) determines potential for voluntary culling
 - voluntary culling rate determines dam side of genetic progress

Nationally, 94% of genetic progress is from sire side, 6% is from dam side



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SIRE SELECTION

One philosophy would be to:

- Use PRODUCTION data (or composites such as Selection indexes(RZG),NVITPI, NM\$, PL) to select bulls.
- Use TYPE data to select which cows to mate a bull to.
- Use RELIABILITY to determine how much to use each bull.



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SIRE SELECTION


- Decisions may be directed by the producer's market, and it's pricing scheme.
 - Is milk primarily used for fluid, cheese or other manufacturing uses?
 - Are there strong bonus programs for high components or low somatic cell scores?



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PRODUCTIVE LIFE (LONGEVITY)

- Time in the milking herd before removal by voluntary culling, involuntary culling, or death. Calculated as months of milk in each lactation, summed across lactations, with full credit for complete records and partial credit for short records. Productive life is considered to be complete at 7 years of age.



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PRODUCTIVE LIFE (LONGEVITY)

- Heritability is 8.5%.
- Correlations are:
- Milk .13, Fat .12, Protein .15, SCS -.35, DPR .59, SCE -.19, DCE -.24,
- Composites: Udder .30, Feet & leg .19, Size -.04.



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We do 3 kinds of jobs here: GOOD – FAST - CHEAP

- GOOD and FAST – Won't be cheap.
- FAST and CHEAP – Won't be good.
- GOOD and CHEAP – Won't be fast.



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Developing A Genetic Program

- Analyze the Market
- Set Breeding Priorities that Fit the Market and Your Management System
- Stay Focused
- Keep Program Consistent



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How to Stay Focused

- When selecting bulls, Always select based on breeding priorities.
- Focus on bulls that are the greatest outliers for the priority traits.
- Utilize selection indexes to choose bulls.
- Do not try to use too many bulls.



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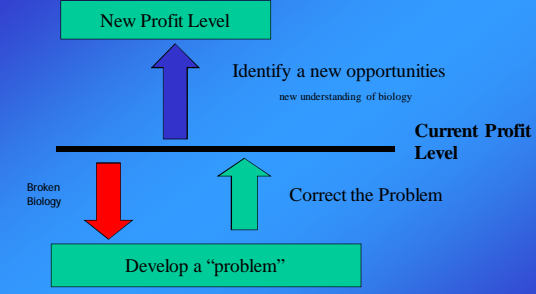
Decision Tools to make herd profitable

- Look at the cow/herd as an investment opportunity (Total value of a COW)
- Define opportunity areas to improve the investment – (Factors that influence that Value)
- Suggest available “tools”
- Future “tools”



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General Concept of “Production Medicine”



New Profit Level


↑ Identify a new opportunities
new understanding of biology

Current Profit Level

↓ Broken Biology

↑ Correct the Problem


Develop a “problem”



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Problem Solve


- What causes decreased milk production?
 - Disease (mastitis)
 - Reproduction
 - Nutrition
 - Genetics
 - Management
 - Culling, milking, age of replacements etc.



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Marginal Cost of Production

- If my cow is going to make 1 more kg of milk, how much does it cost to produce?



?

30 kgs of milk Today → 31 kgs of milk Today



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Average cost of production – milk 30 kgs/day

Total Expense/herd	\$	857
Total expense/cow		8.57
Category/cow		no change
FEED COST	\$	3.60
Hired Labor	\$	1.51
Investment opportunity	\$	
Machise hire	\$	0.23
Machise repair	\$	0.40
Fuel and oil	\$	0.13
Replacement Livestock	\$	0.12
Breeding	\$	0.09
Vet/med	\$	0.30
Milk Markets	\$	0.28
Bedding	\$	0.13
milking supplies	\$	0.19
cattle lease	\$	0.04
Custom Boarding	\$	0.12
BST expense	\$	0.17
Other Expense	\$	0.08
Fertilizer/Lime	\$	0.18
Seed and Plants	\$	0.12
Spray and other crop exp.	\$	0.15
Land/building/repair	\$	0.16
Taxes	\$	0.08
Real estate rent	\$	0.16
Insurance	\$	0.08
Utilities	\$	0.16
Milk Marketing	\$	0.08

AVERAGE Feed cost/cow = \$3.60
Feed \$/lb of milk = \$3.60/70 = \$.05
\$5.00/cwt of milk
Is this my marginal cost of Production?

NO !!!

It too has the fixed cost
Of cow Maintenance = \$1.50



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Marginal Cost of Making Milk –

The Cow has “fixed Cost” as well



30 kgs of milk

Maintenance: €1.00

Variable 1.5€



31 kgs of milk

1.00€ FIXED

1.52€

It only cost **0.2€** to produce the last kg of milk!!!
I get 0,23€ pre kg of milk




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What is the Marginal Cost of Milk on Your Farm?

Ration cost of Average Cow € Ration cost of Dry Cow €

Average Milk Production Level (kg)

0,2€/ kg of milk




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Culling

- It happens for good and bad
- Too Early
 - Cow leaves before the optimal time
 - has a catastrophic health event affecting production, longevity etc
 - fails to get pregnant
- Too Late
 - Cow leaves after the optimal time
 - producer could have made a better investment in a replacement animal

Much Harder to See
It is a
Lost Opportunity



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DILEMMA FOR MODERN PRODUCERS

1. In large commercial herds, cows aren't known as individuals.
2. Reality focuses almost all management pressure on current issues (*daily production, herd health and fertility, monthly cash flow, personnel management, etc.*)
3. Managers and consultants are evaluated on current results, not genetic progress, which demonstrates itself gradually, over several years.



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