



Integration of longevity into the Walloon genetic evaluation system

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Objective of the study

- Integration of « longevity » into global economic index (V€G) used in Walloon Region of Belgium:
 - Correlations between economic indexes and direct longevity
 - Genetic relationships between type traits and direct longevity



Walloon genetic evaluation system

- Direct Longevity (since May 2005)
 - Random Regression lactation survival animal model (all known lactations)
- Type traits :
 - MT-CT-AM : 25 linear traits and 8 synthetic traits (also scored)



Walloon genetic evaluation system

- Production traits
 - MT-ML-TD-AM : milk, fat and protein yields for first three lactations
- Somatic cell score (SCS)
 - ML-TD-AM : first three lactations

Current Walloon genetic evaluation system

V€G = global index used in the Walloon Region of Belgium and that represents the expected lifetime economic profitability

$$\mathbf{V\text{€}G} = \mathbf{V\text{€}L} + \mathbf{V\text{€}T} + \mathbf{V\text{€}F}$$

Partial economic index functionality

only SCS !!!

Partial economic index milk

Production traits :
milk, fat and protein yields

Partial economic index type

$$\mathbf{V\text{€}T} = \mathbf{V\text{€}P} + \mathbf{V\text{€}C} + \mathbf{V\text{€}M}$$

V€P = second order index for udder traits

V€C = second order index for body traits

V€M = second order index feet and legs

Future Walloon genetic evaluation system

V€G = global index used in the Walloon Region of Belgium and that represents the expected lifetime economic profitability

$$\mathbf{V\text{€}G} = \mathbf{V\text{€}L} + \mathbf{V\text{€}T} + \mathbf{V\text{€}F} \longrightarrow \text{Partial economic index functionality}$$

SCS and *Direct longevity* !!!



Correlations of current economic indexes with direct longevity

Index			
Global	Partial	Second order partial	Correlation
V€G			0.15
	V€L		0.05
	V€T		0.17
		V€P	0.27
		V€C	-0.11
		V€M	0.02
	V€F		0.30

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Low correlations with direct longevity, except for V€P

→ not in accordance with reality in the field !



Correlations of economic indexes with direct longevity

- In addition to the integration of longevity into global economic index, economic type indexes have been improved!!!



Correlations of linear type traits with direct longevity

- In red INTERBULL traits
- Correlations weighted by reliability of longevity BV
- ➔ ~ approximated genetic correlations (Calo et al, 1973)

Conformation trait	Correlation	Positive impact on longevity
Stature	-0.02	Shorter
Chest width	-0.15	Narrower
Body depth	-0.20	Shallower
Chest depth	-0.21	Shallower
Loin strength	0.07	Stronger
Rump length	-0.04	Shorter
Rump angle	0.12	Lower
Hips width	-0.13	Narrower
Rump width	-0.13	Narrower
Foot angle	0.01	Steeper
Rear leg set	-0.08	More curved
Bone quality	0.21	Flatter
Rear leg rear view	0.04	Straighter
Udder balance	0.18	Higher rear
Udder depth	0.29	Shallower
Teat placement side	-0.08	Shorter
Udder support	0.17	Stronger
Udder texture	0.09	Softer
Fore udder	0.18	Stronger
Front teat placement	0.11	More inside
Teat length	-0.06	Shorter
Rear udder height	0.14	Higher
Rear udder width	-0.04	Narrower
Rear teat placement	0.09	More inside
Angularity	-0.05	Less angular

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Correlations of composite type traits with direct longevity

(in red INTERBULL traits)

Conformation trait	Correlation	Positive impact on longevity
Overall development	-0.12	(-)
Overall rump	-0.09	(-)
Feet and legs	0.18	(+)
Overall udder score	0.25	(+)
Overall fore udder	0.24	(+)
Overall rear udder	0.18	(+)
Dairy character	-0.02	(-)
Final conformation	0.13	(+)



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Dairy character	-0.02	(-)
Final conformation	0.13	(+)



Correlations between type traits and direct longevity

- Balanced morphological animal → better longevity
- Some type traits = good predictors of longevity!



Partial type indexes

- Composition of $V_{€C}$ and $V_{€M}$ reworked in accordance with “approximated genetic correlations” between type traits and direct longevity
 - Why?
 - To be closer to the reality
 - To express type contribution to direct longevity
 - How ?
 - multiple regressions on the economic function of lifetime profitability → coefficients / weights

Definition of Walloon economic indexes for type traits

Index	Partial index / trait	Relative importance in	
		Partial index	VEG
VEM	Rear leg set	16%	1,4%
	Rear leg rear view	8%	0,7%
	Bone quality	41%	3,7%
	Feet and legs	35%	3,2%
VEC	Overall development	28%	0,3%
	Final conformation out udder	72%	0,7%
VEP	Fore udder	14%	2 %
	Rear udder height	23%	3,2%
	Udder support	9%	1,3%
	Udder depth	23%	3,2%
	Front teat placement	4%	0,5%
	Rear teat placement	18%	2,5%
	Teat length	9%	1,3%



Integration of direct longevity in V€G

- New definition of economic index for the functional traits (V€F)
 - Composed by SCS and direct longevity!
 - Coefficients obtained by multiple regressions on the economic function of lifetime profitability

Definition of Walloon economic indexes

Index	Partial index / trait	Relative importance in	
		Partial index	V€G
V€G	V€L	48%	48%
	V€F	28%	28%
	V€T	24%	24%
V€L	Milk (kg)	21%	10%
	Fat (kg)	19%	9%
	Protein (kg)	60%	29%
V€F	Somatic cell score	18%	5%
	Direct longevity	82%	23%
V€T	V€M	36%	9%
	V€C	6%	1%
	V€P	58%	14%

Correlations of economic indexes with direct longevity

Index				Correlation	Correlation (improved index)
Global	Partial	Second order partial			
V€G				0.15	0.59
	V€L			0.05	0.06
	V€T			0.17	0.31
		V€P		0.27	0.27
		V€C		-0.11	0.25
		V€M		0.02	0.22
	V€F			0.30	0.98



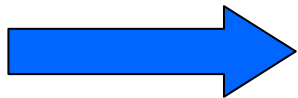
Correlations between current and improved economic indexes

Indexes	Correlation with the improved one
V€G	0.85
V€L	1.00
V€T	0.83
V€C	-0.43
V€M	0.51
V€P	1.00
V€F	0.48



Conclusions

- Important relationships between direct longevity and type traits
- Economic indexes for type traits were improved
- Now, V€G takes direct longevity into account !
 - V€F composed of SCS and longevity



Closer to the reality in the field !!!



Conclusions

- Improvement of current genetic evaluation system for longevity of the Walloon cows
- Development of combined longevity evaluations



Thank you for your attention !!!



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RÉGION WALLONNE

