Female Fertility Expression for Walloon Dairy Cattle

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Why? Objective

Develop a useful index to express female fertility (pregnancy rate) of the Walloon dairy cattle combining direct and indirect female fertility information available

Methods

How?

✓ Principal Component Analysis (PCA) on 604 common bulls between the six countries

✓ Regressions of INTERBULL proofs on the first principal component

⇒ Direct female fertility index (DFF)

✓ Multiple regression method to find best predictors among other traits evaluated in the Walloon Region

⇒ Indirect female fertility index (IFF)

✓ Theory of selection index to combine DFF and IFF

⇒ Combined female fertility index (CFF)

Material

✓ Published official female fertility indexes provided by Canada, France, Germany, Italy, Netherlands and USA for bulls in each country

✓ Genetic breeding values of female fertility came from Walloon pregnancy rate data

✓ International bulls proofs of female fertility evaluated by INTERBULL

✓ Official genetic breeding values of other traits evaluated in the Walloon Region for bulls

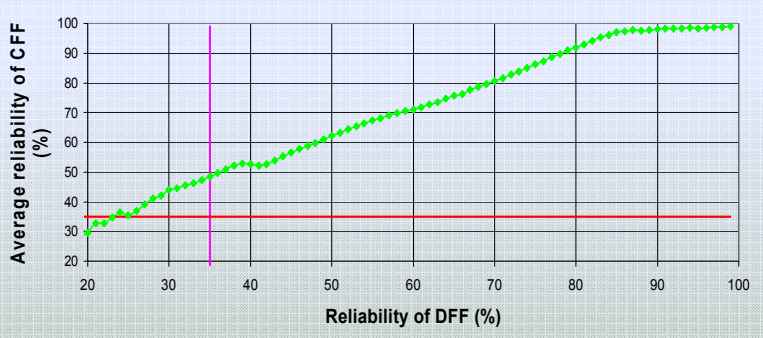

Figure1: Average reliability of CFF as a function of reliability of DFF for bulls; limits of publication for DFF (35%) in pink and for CFF (35%) in red

Conclusions

Combined female fertility index provides:

✓ a pretty good expression of female fertility for Walloon dairy cattle

✓ a better accuracy for young bulls

✓ a useful first indication of female fertility potentiality for bulls without INTERBULL proofs

Results

✓ First component of PCA explained 80% of total variance of six foreign indexes

✓ R^2 of regressions ranged from .510 to .671

✓ IFF_{BCS} or IFF_{ANG} composed of 9 good predictors of female fertility: milk yield, protein, somatic cell score, stature, body depth, overall udder score, overall feet and legs, final conformation score and body condition score (function of its availability) or angularity

✓ $CFF = .762 * DFF + .374 * IFF_{BCS}$
$CFF = .776 * DFF + .364 * IFF_{ANG}$

Table 1: Correlations between female fertility indexes and the first principal component for publishable bulls in Walloon Region

	DFF	IFF_{BCS}	IFF_{ANG}	CFF
DFF				
IFF_{BCS}	.50			
IFF_{ANG}	.57	.99		
CFF	.96	.75	.80	
1st component	.82	.57	.57	.83

No Loss of information to combine DFF with IFF into CFF

✓ Increase of accuracy: 25% between DFF and CFF

✓ More publishable bulls with CFF than DFF

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