



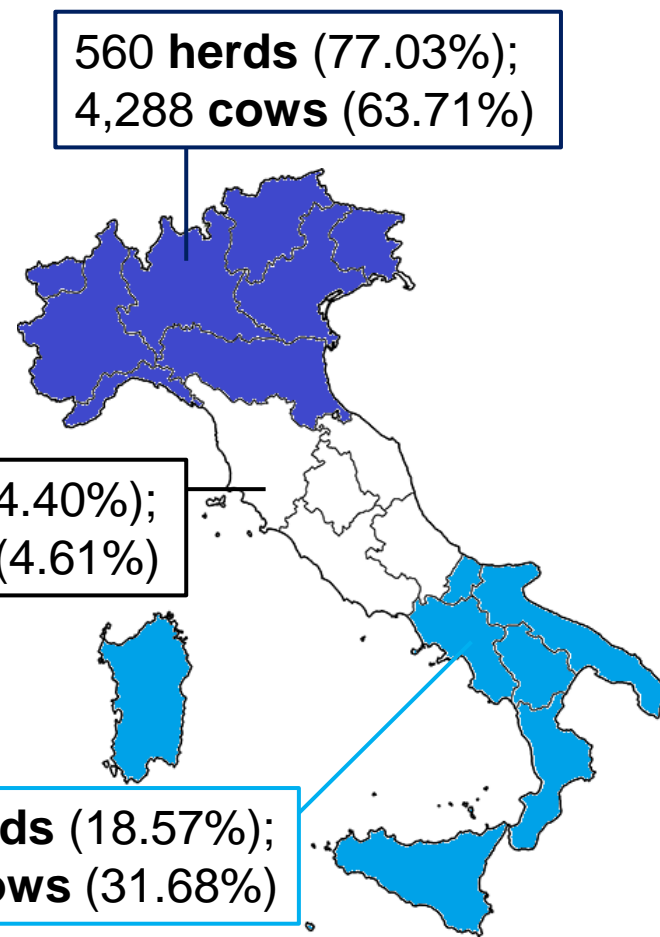
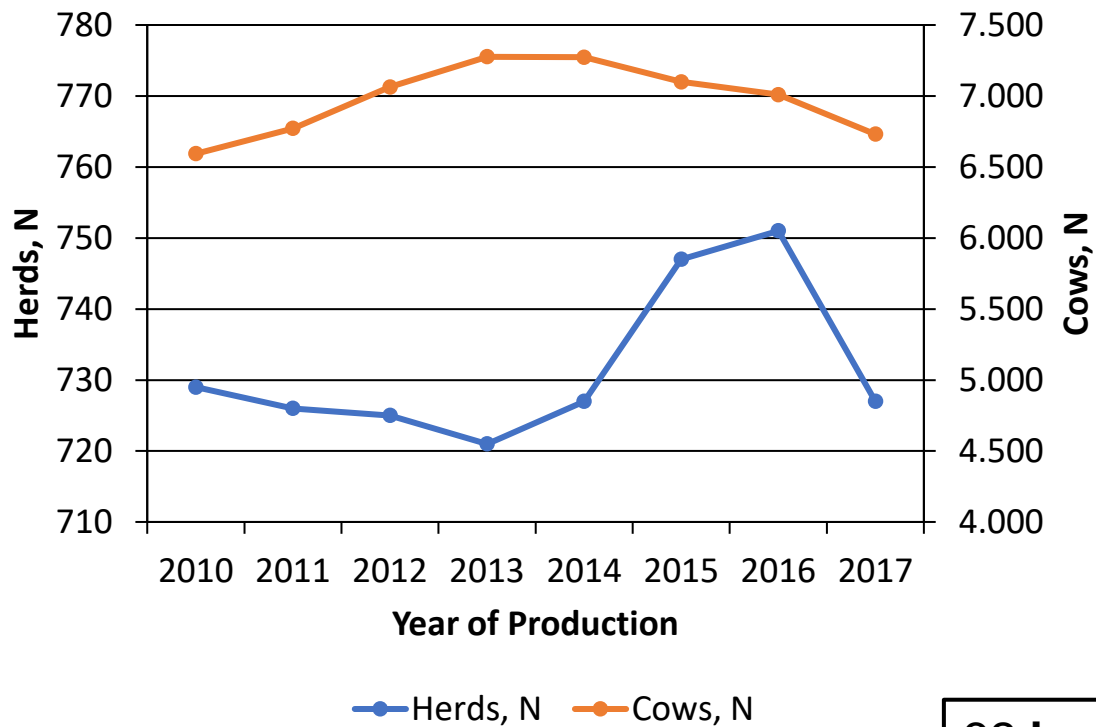
Factors Associated with Feed Efficiency Traits in Italian Jersey cows

F. Monti¹, G. Visentin², M. Marusi², R. Finocchiaro², J. B. C. H. M. van Kaam², G. Civati², R. Davoli¹

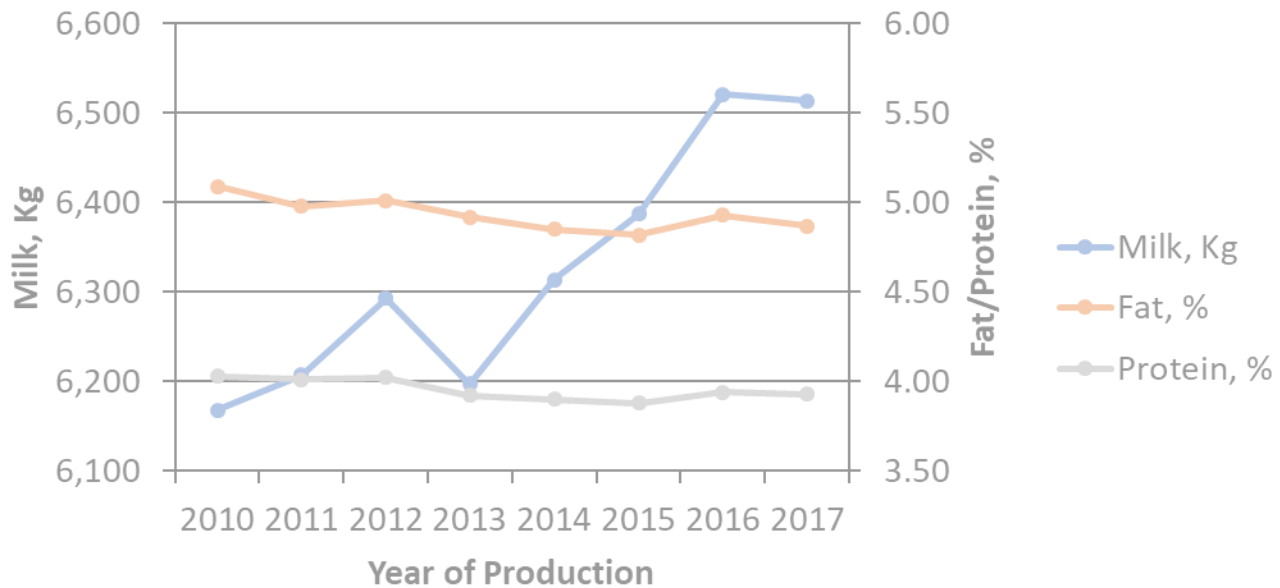
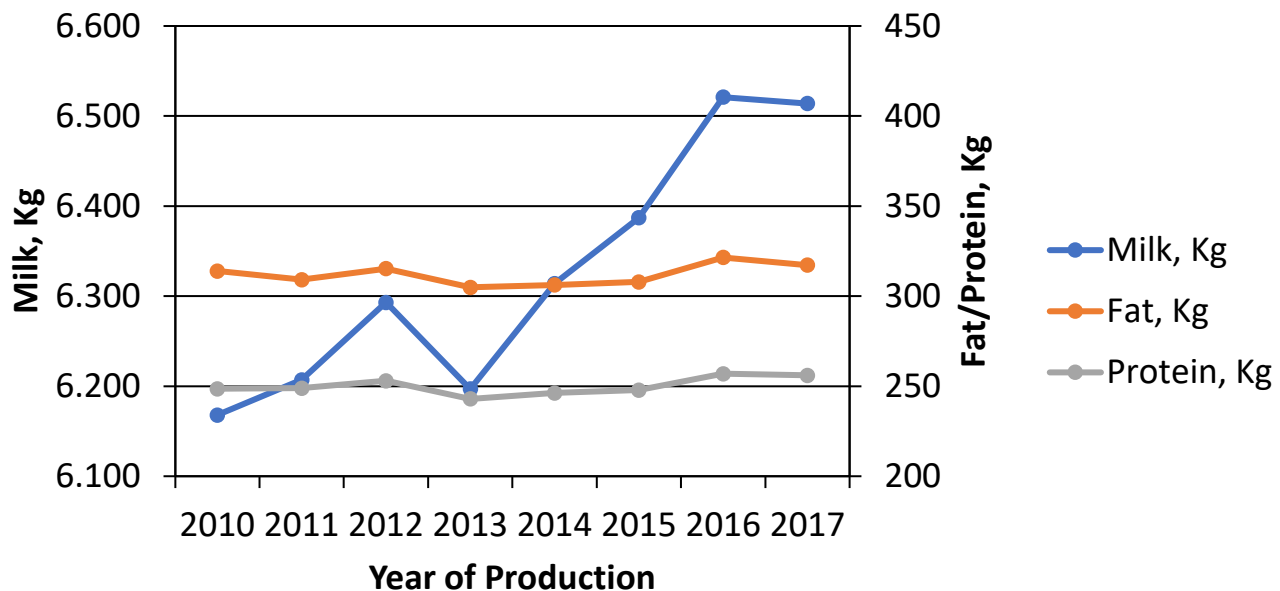
¹Department of Agricultural and Food Sciences (DISTAL), University of Bologna, Bologna (BO), Italy

²Associazione Nazionale Allevatori bovini della razza Frisona Italiana (ANAFI), Cremona (CR), Italy

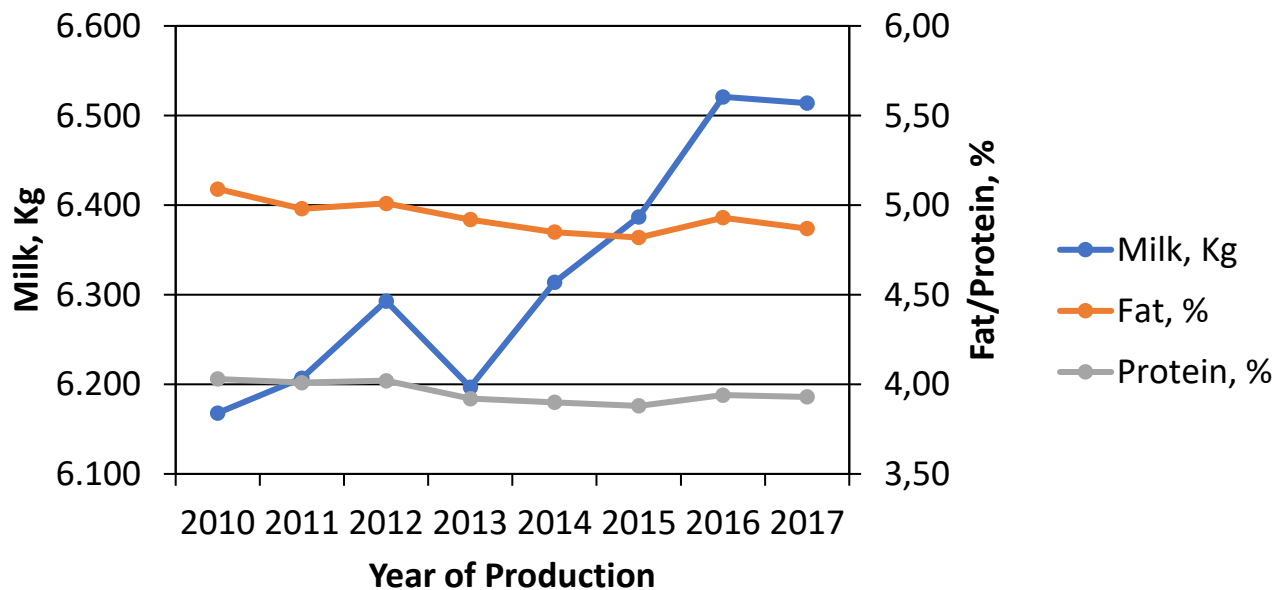
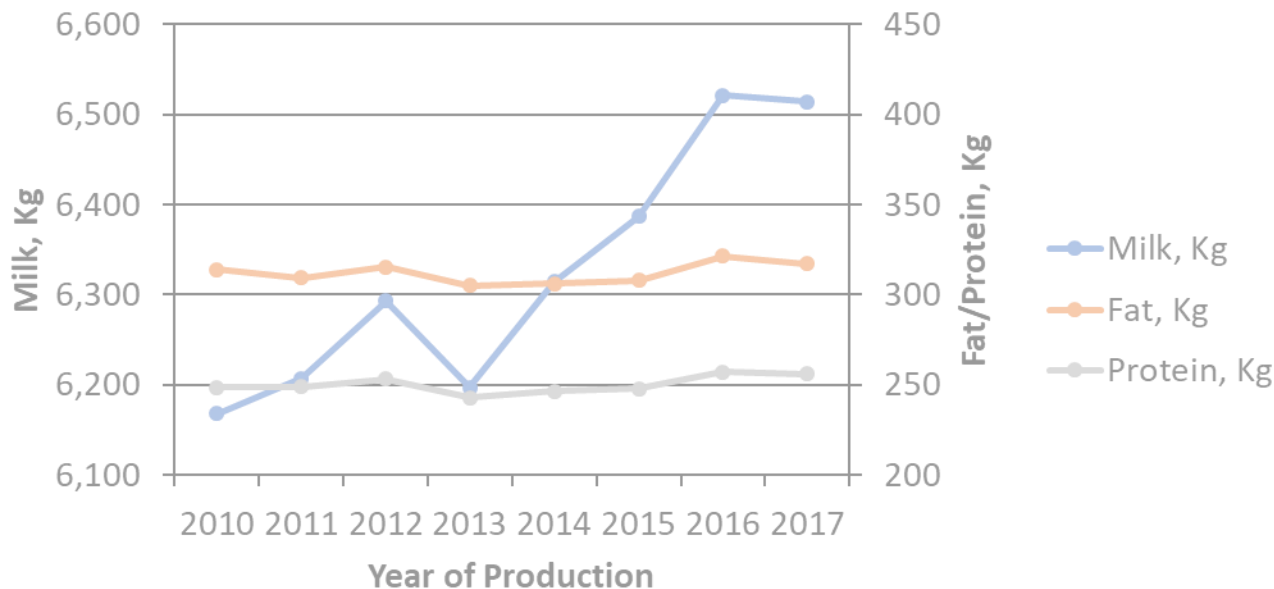
Jerseys in Italy



Jerseys in Italy

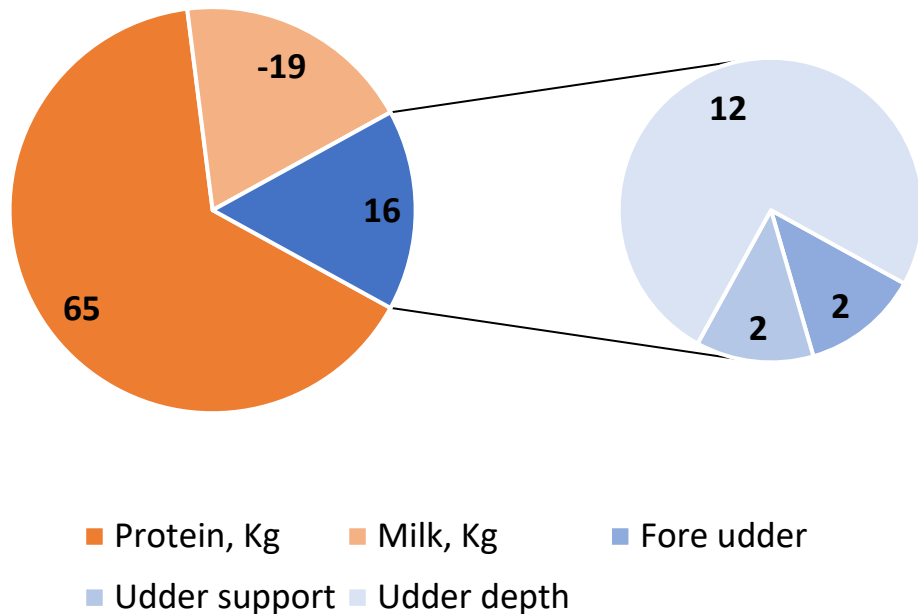


Jerseys in Italy



Jersey Quality Index (IQJ)

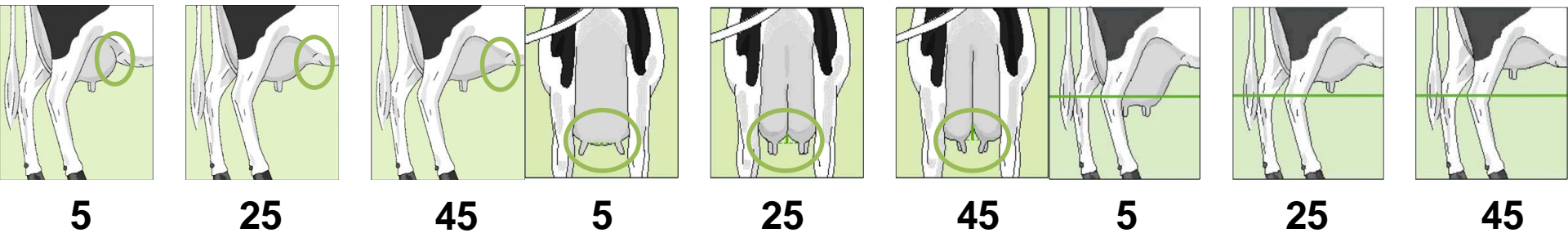
- Introduced in **2002** (only **production traits**)
- **Functionality** in **2005**
- **New traits** yet to be included (udder health, feed efficiency)



Fore Udder

Udder Support

Udder Depth



Feed Efficiency is Important!

- Increment of world population → Produce **more**
- Global warming → land base is **less**
- At some point...a **Carbon Tax**???
- A **feed-efficient animal** is the one which delivers the highest amount of energy ingested into animal products





Is Feed Efficiency Measurable?

- Data collection?
- Trait definition?
- **Use information available on Jersey population to:**
 - ✓ **Predict feed efficiency phenotypes**
 - ✓ **Identify their sources of variation**

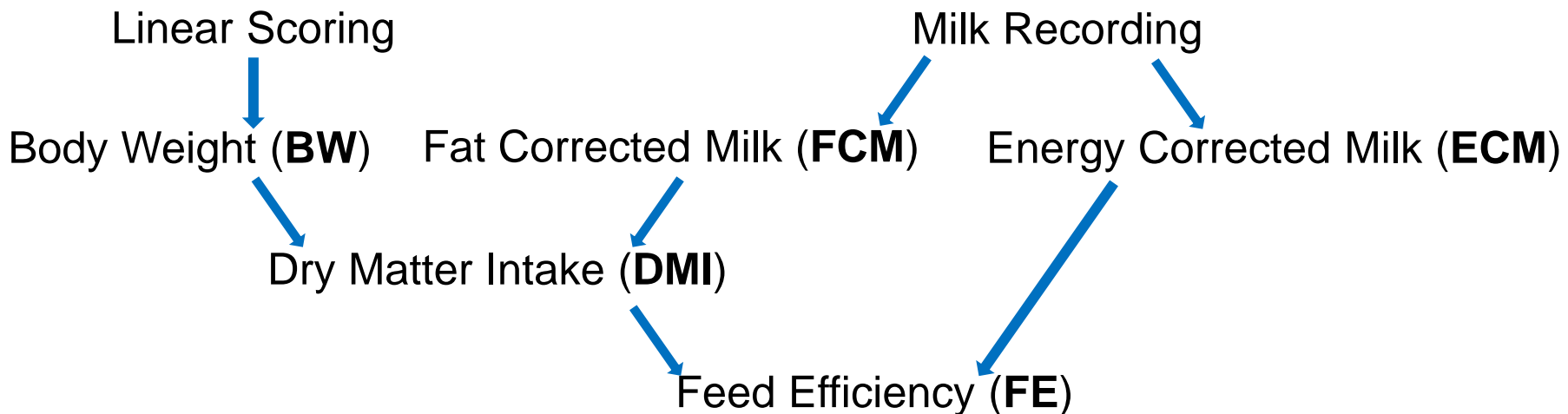


(Which) Data

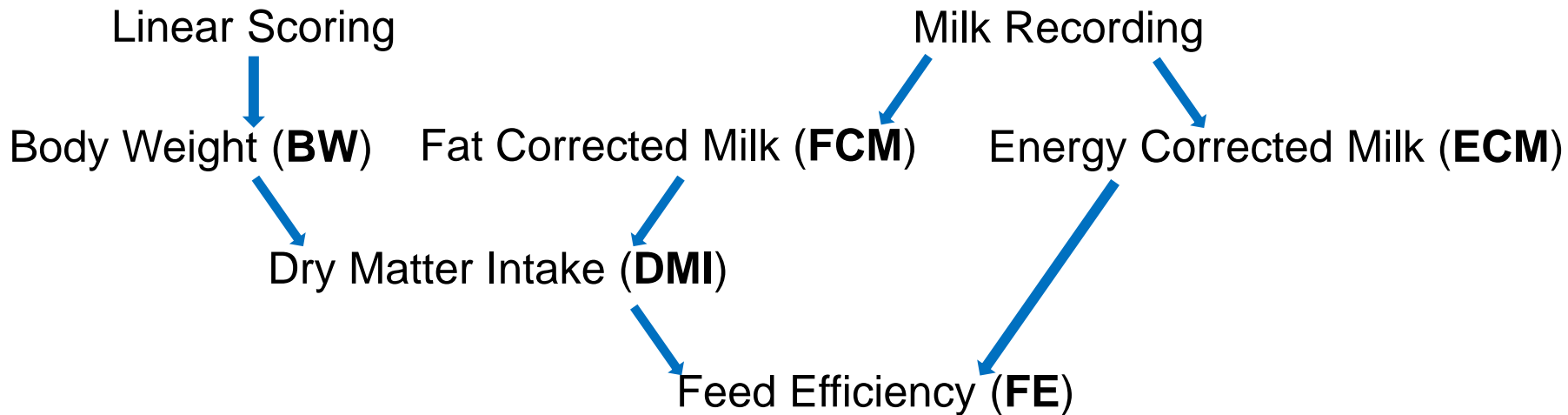
- National Recording system:
 - ✓ **Production traits** (Milk yield/composition)...once every 5 weeks, all parities
 - ✓ **Linear type traits**...once all primiparous cows

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(Which) Data



- **BW**: age at scoring, stature, body depth, chest and rump width (Finocchiaro et al., 2018)
- **FCM**(4%), **DMI**: Nutrient Requirement for Dairy Cattle, 2001
- **ECM**: milk, fat%, protein% (Sjaunja et al., 1990)
- **FE**: ECM/DMI



(Which) Data

- 14,582 Jerseys **type scored** (only first-parity) since 2000
- 527,585 **milk records** from 24,447 **cows** (all parities)
- **Linear scoring** ↔ **date closest milk recording date**
(max time distance allowed 30 d)
- After edits (DIM, CG) 8,516 first parity Jersey cows
- Prediction formulae applied to this dataset

Mixed Model

$$y = Xb + Zh + Zc + e$$

- **b fixed effects** of:
 - ✓ Origin of paternal grandsire
 - ✓ Stage of lactation
 - ✓ Year of birth
 - ✓ Age at calving
- **h: random effect** of herd-year-season al scoring
- **c: random effect** of cow
- **e: random effect** of residual

Descriptive Statistics

Trait ¹	Mean	SD	Range	CV, %	σ_h^2 , %	σ_c^2 , %
BW, Kg	411.88	45.36	309.2	11.01	37.85	31.07
FCM, Kg	22.25	5.44	43.56	24.45	44.20	27.90
DMI, Kg	16.40	2.41	17.40	14.70	44.80	27.60
ECM, Kg	22.56	5.44	44.50	24.11	46.69	26.65
FE, unit	1.37	0.23	2.08	16.79	42.77	28.61

¹BW = body weight; FCM = fat corrected milk; DMI = dry matter intake; ECM = energy corrected milk; FE = feed efficiency (ECM/DMI)

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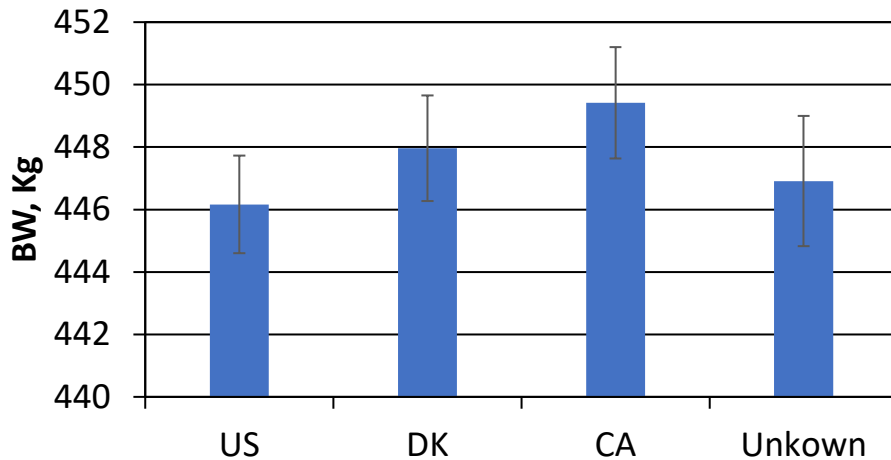
Phenotypic Correlations

Trait ¹	BW	FCM	DMI	ECM
FCM	0.12	-		
DMI	0.50	0.80	-	
ECM	0.13	0.99	0.81	-
FE	-0.25	0.78	0.29	0.78

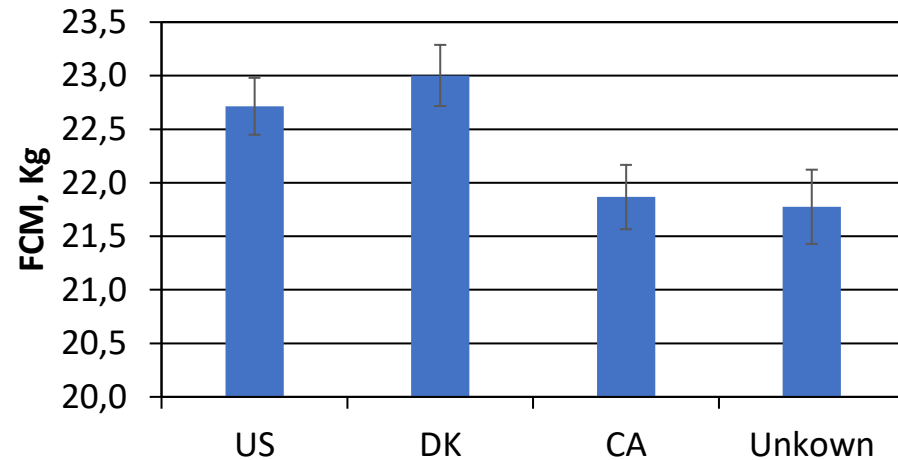
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Paternal Grand sire Effect

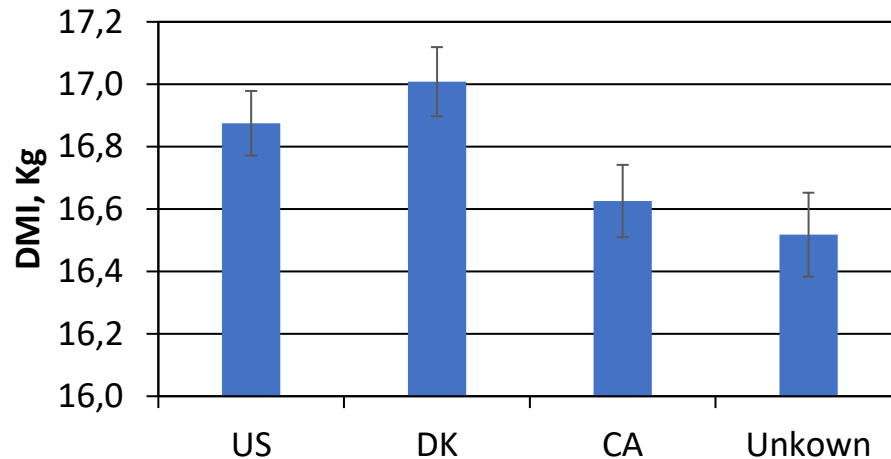
Body Weight



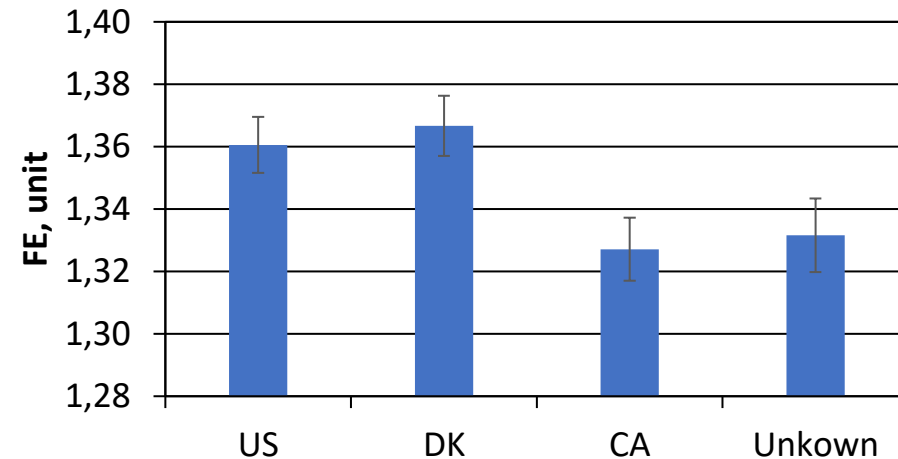
Fat Corrected Milk



Dry Matter Intake

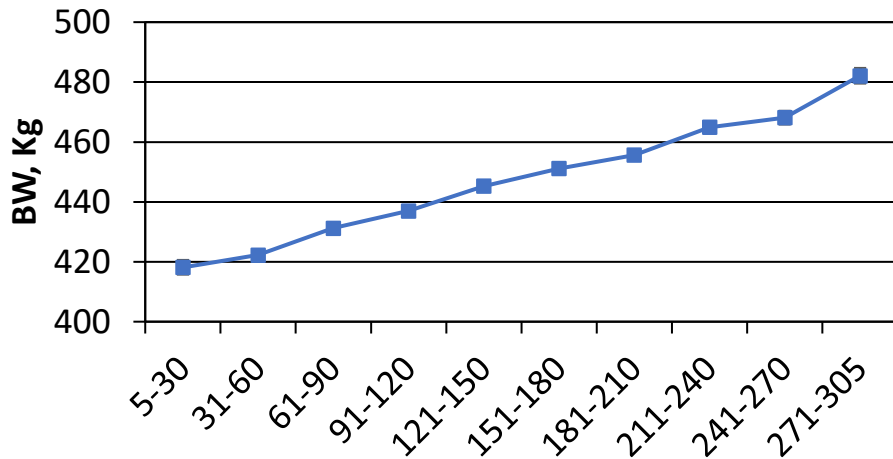


Feed Efficiency

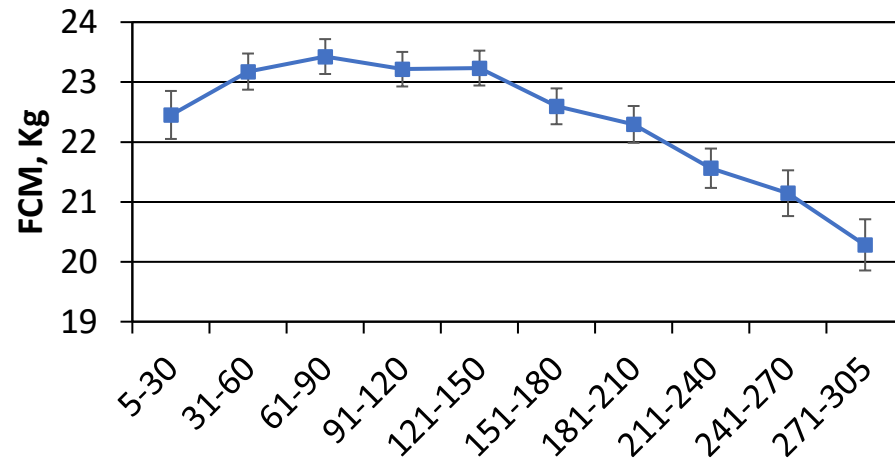


Stage of Lactation Effect

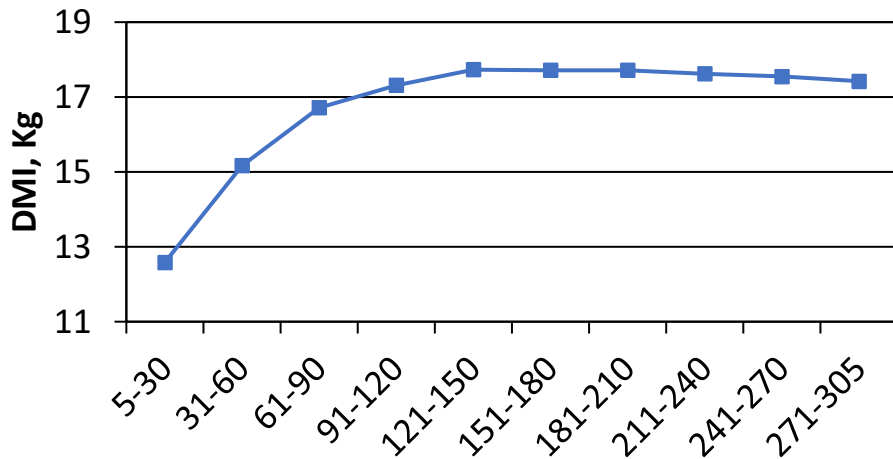
Body Weight



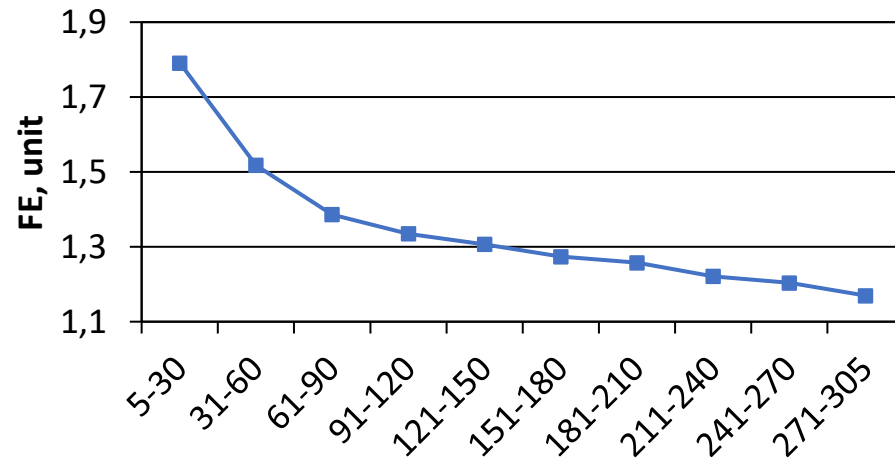
Fat Corrected Milk



Dry Matter Intake

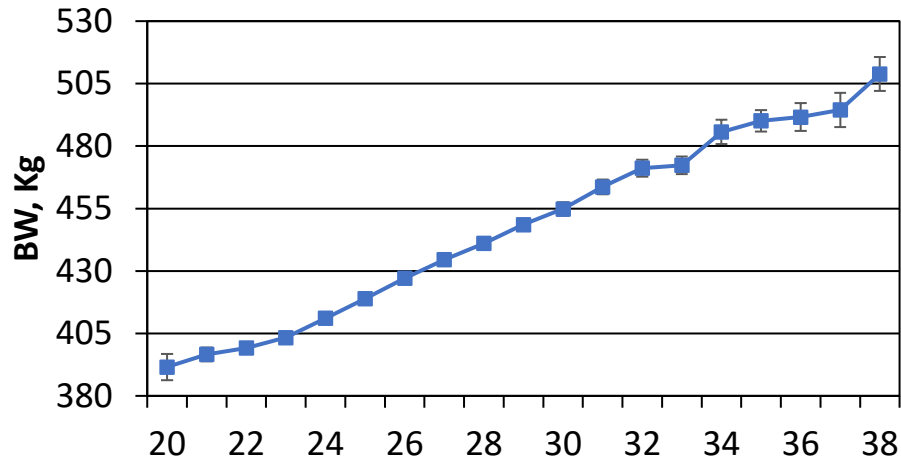


Feed Efficiency

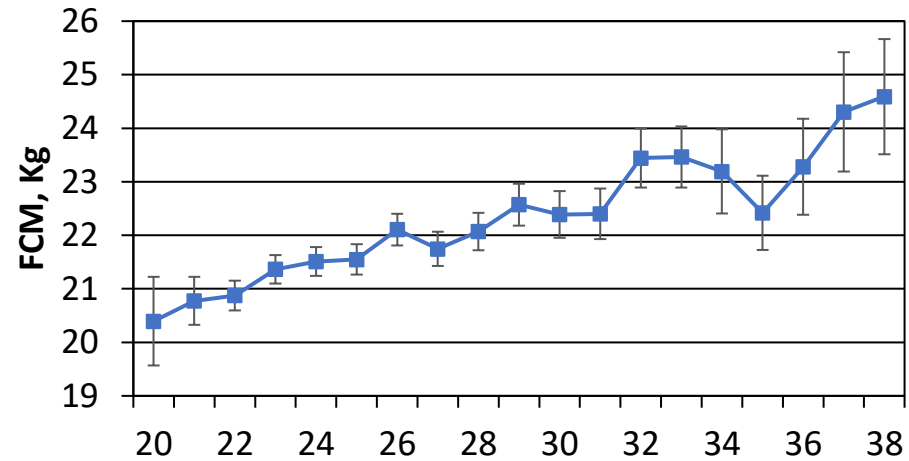


Age at First Calving Effect

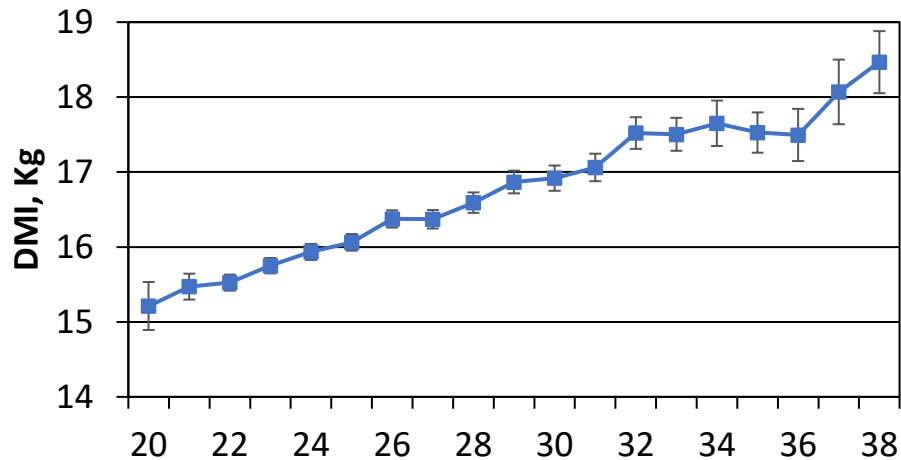
Body Weight



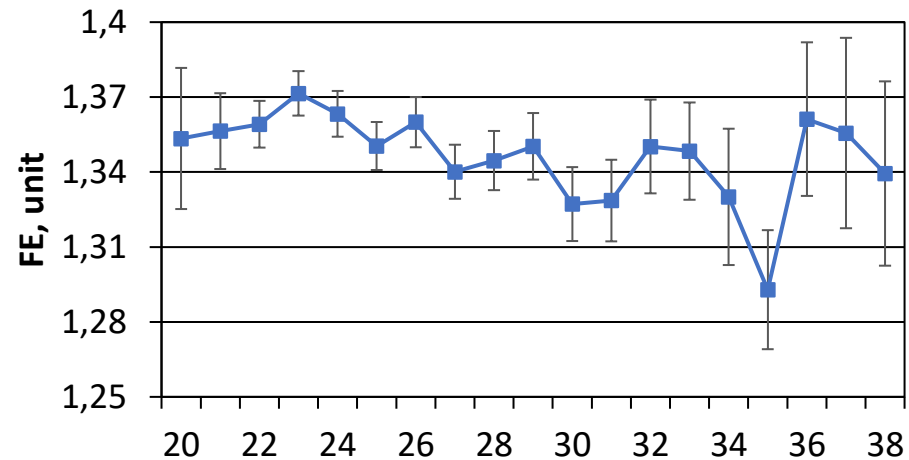
Fat Corrected Milk



Dry Matter Intake



Feed Efficiency



Take at Home Messages

- Factors indentified will be used to **adjust phenotypes** for VC estimation of FE in Jersey
- **High-yielding animals** are ‘**the most feed efficient**’ ...
- But **different FE** may led to different results?
- Prediction formulae still need **validation** on reference data





Thank You! Hvala! ...

Any Question?