Factors Associated with Feed Efficiency Traits in Italian Jersey cows

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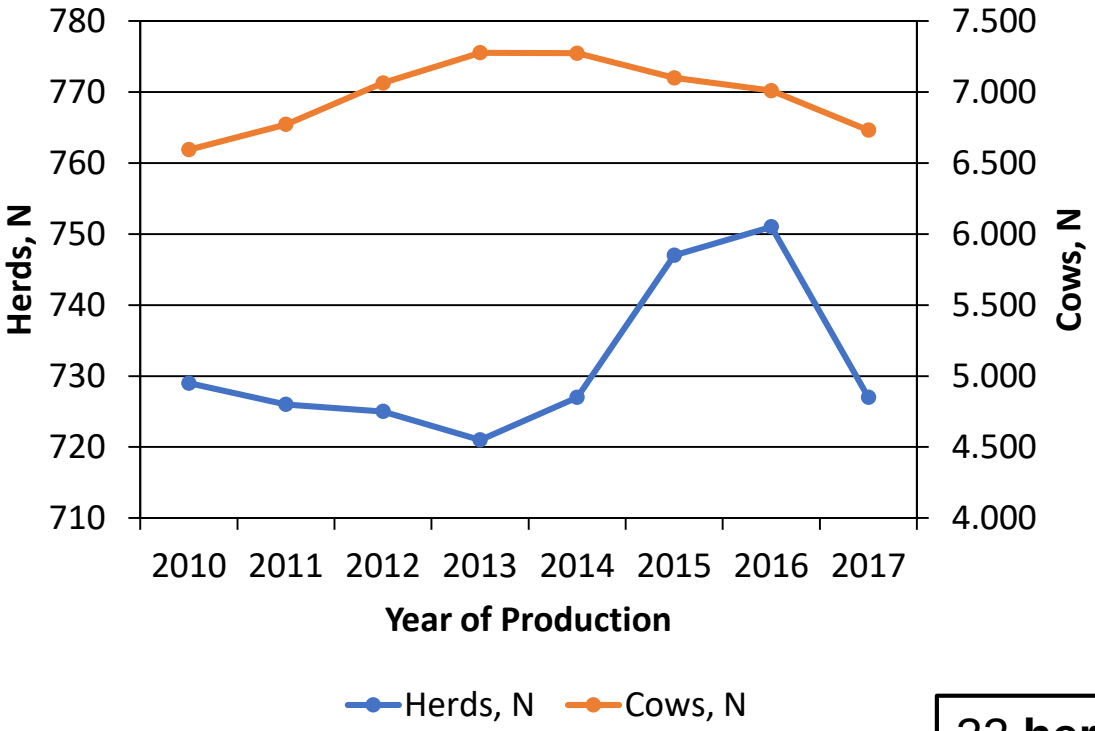
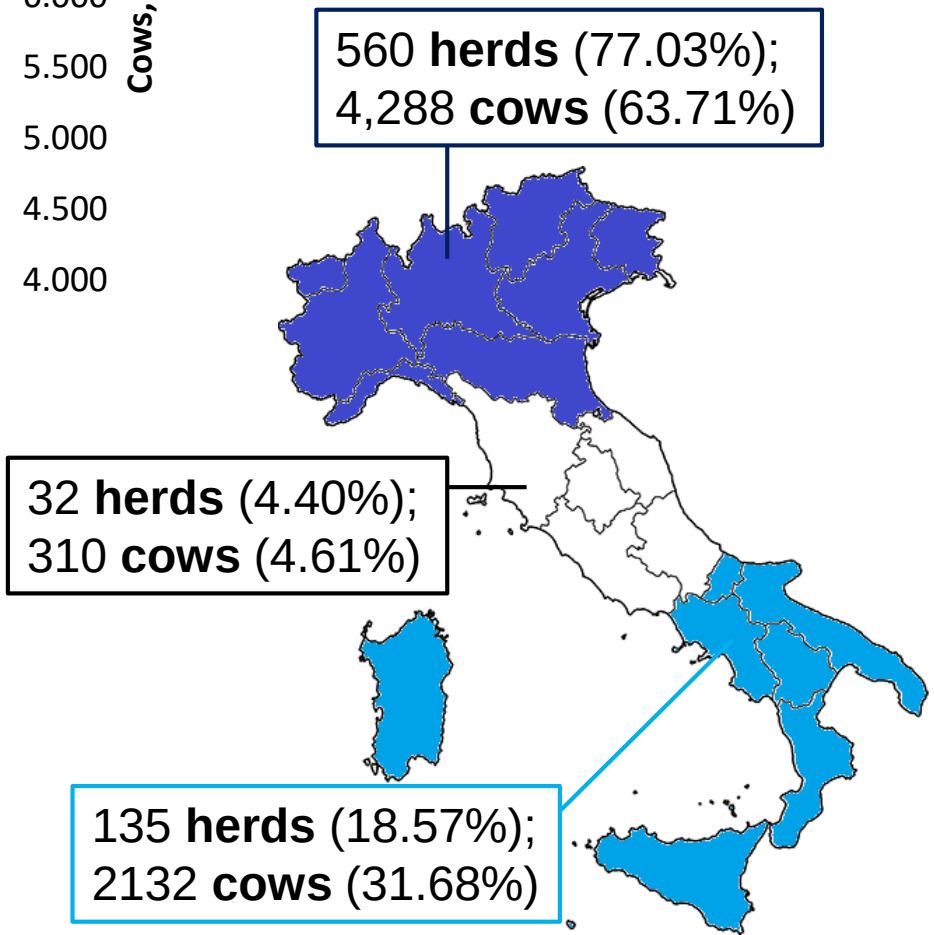
Jerseys in Italy





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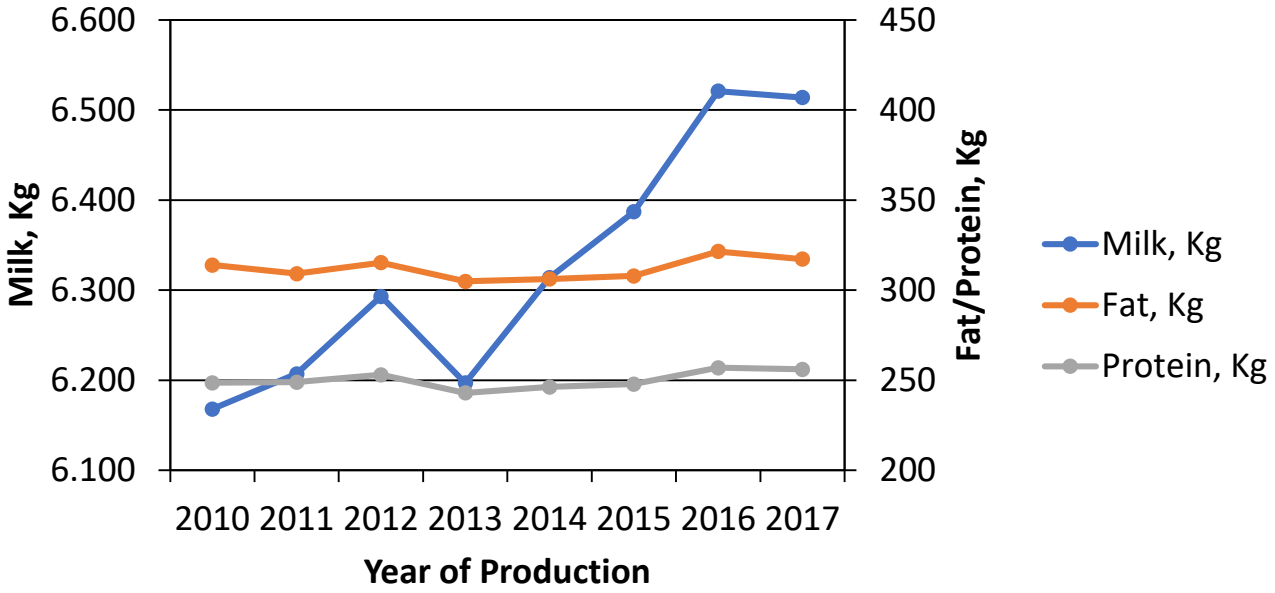

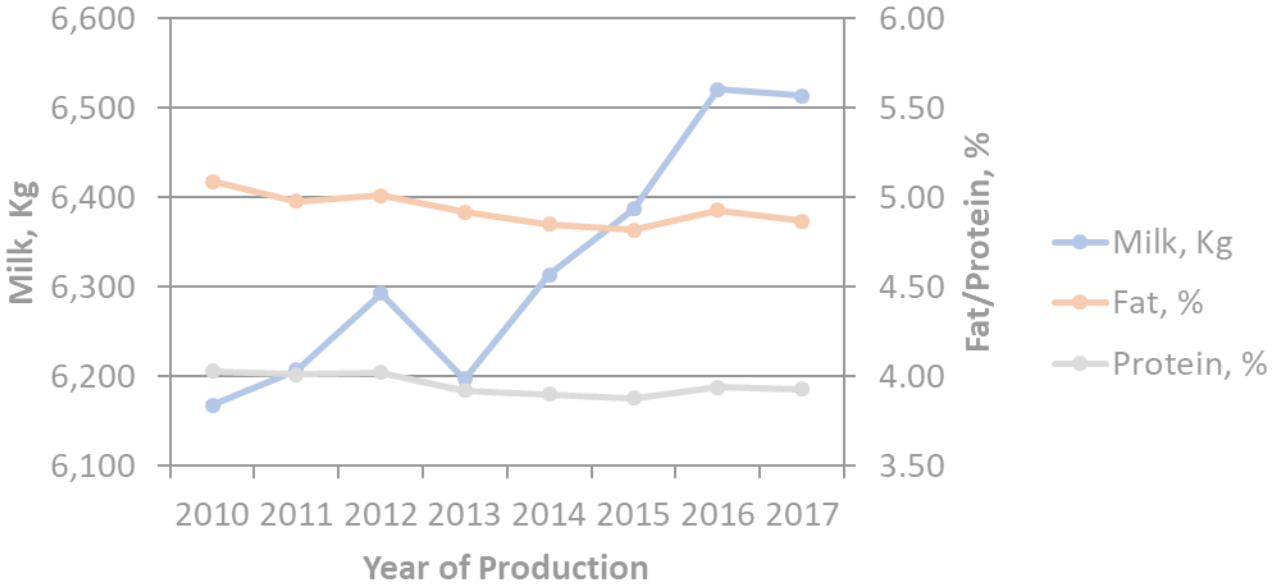

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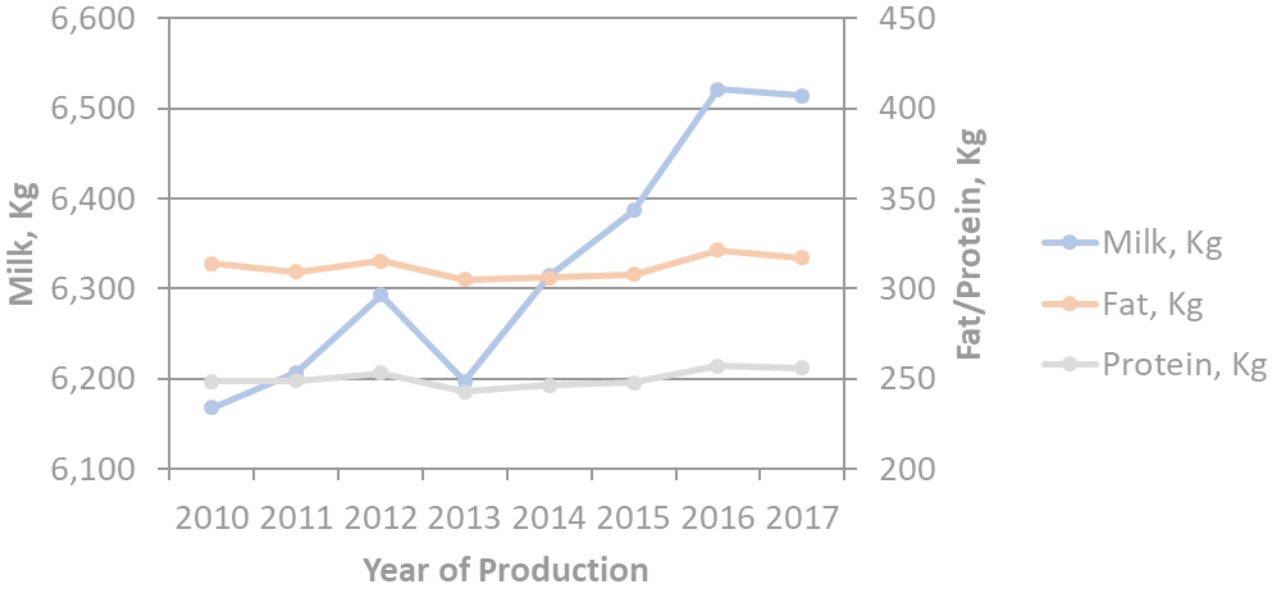
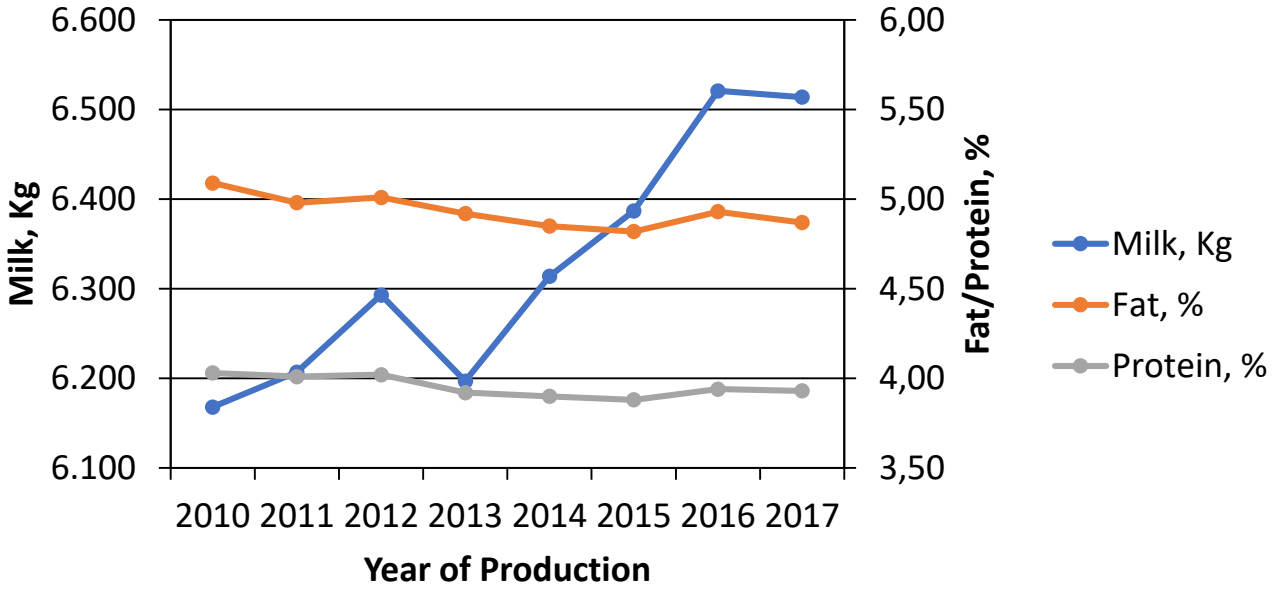
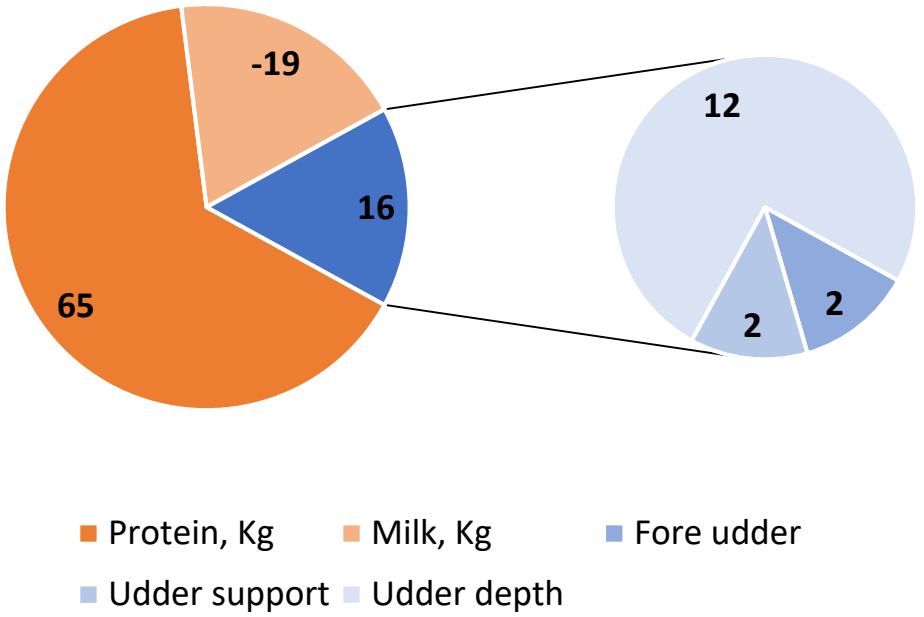
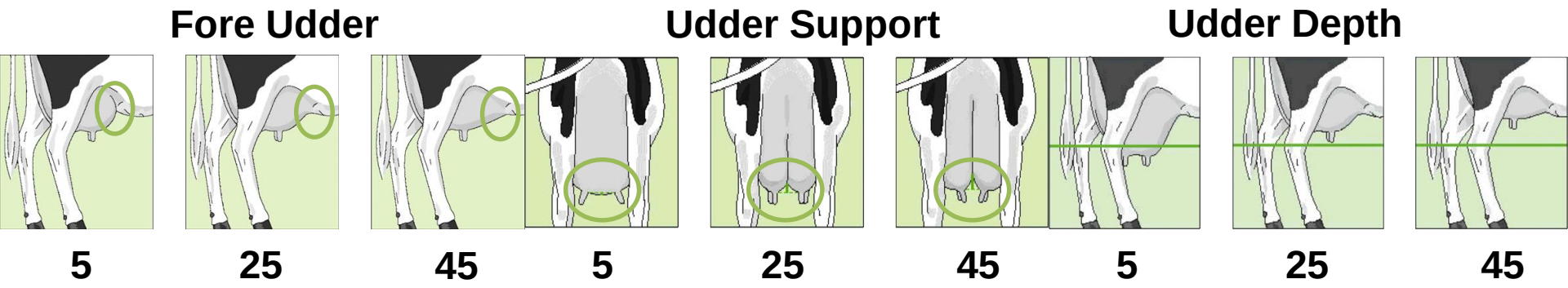




Jersey Quality Index (IQJ)

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





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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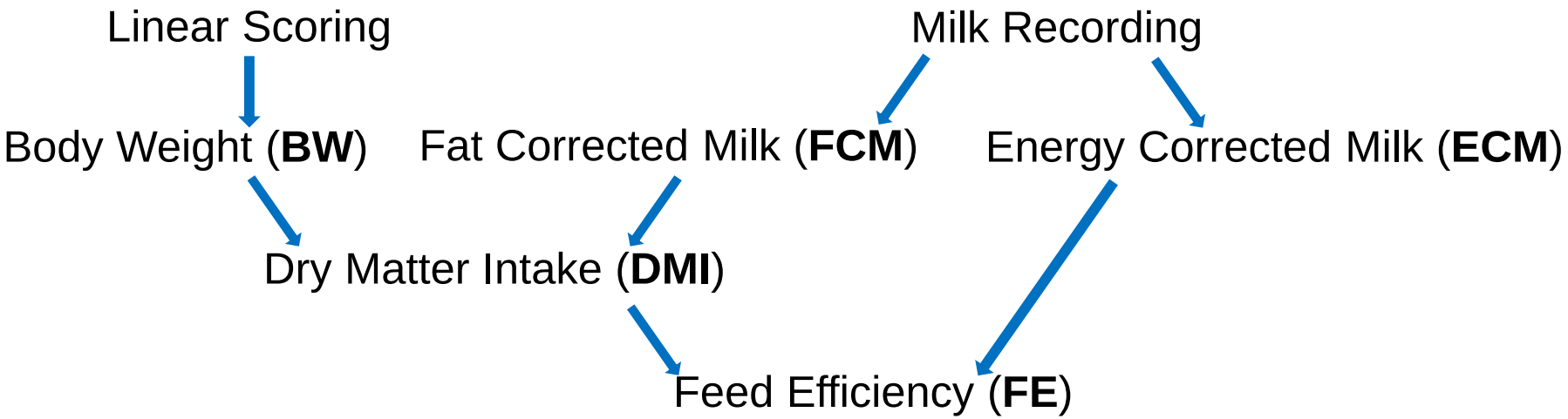
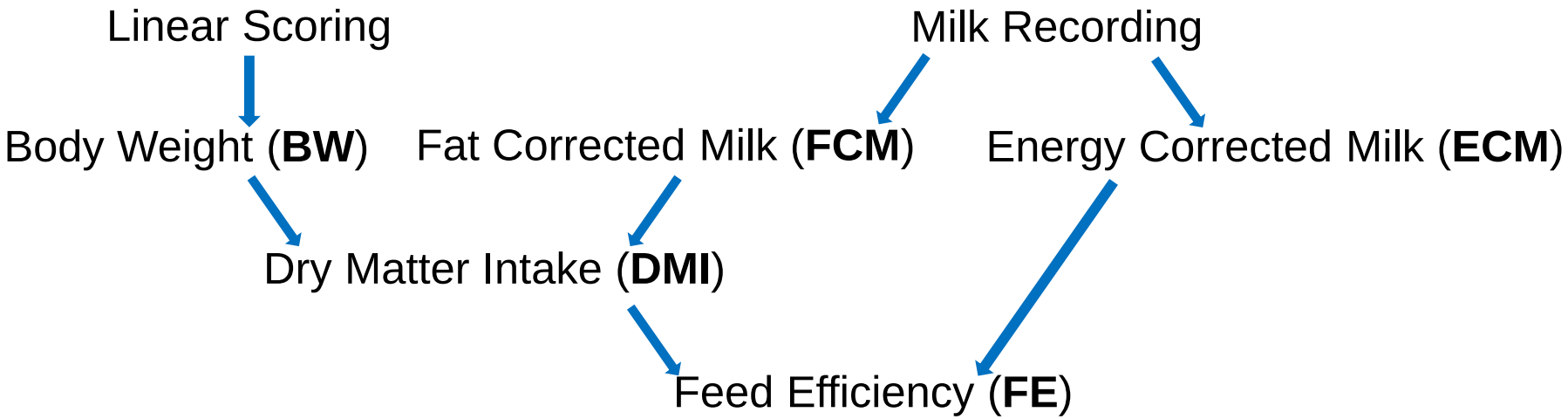


(Which) Data



- **BW**: age at scoring, stature, body depth, chest and rump width (Finocchiaro et al., 2017)
- **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 at 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

[1]BW = 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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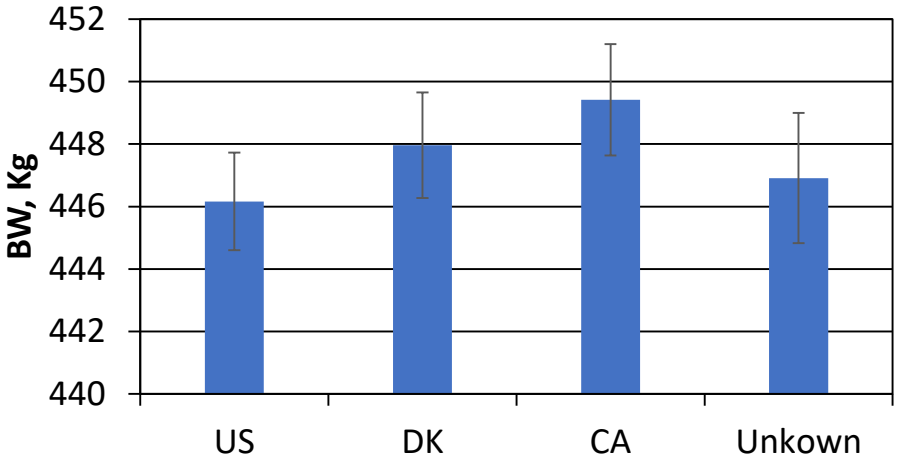
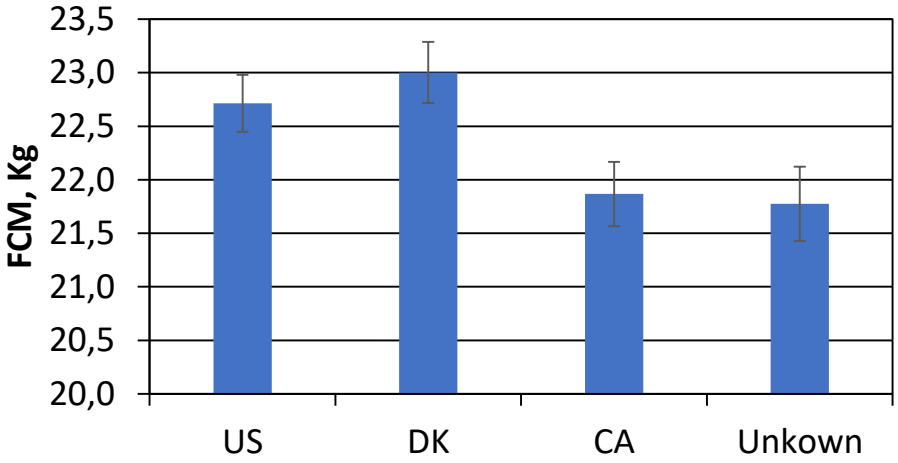
Paternal Grandsire Effect

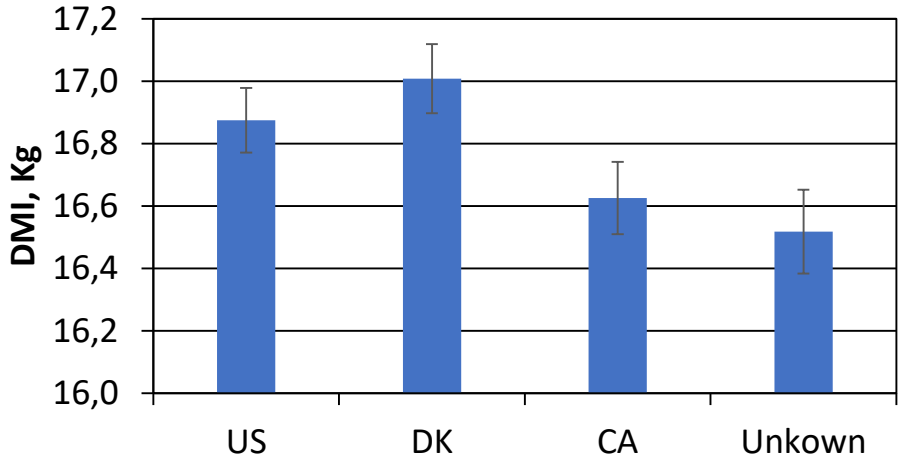
Body Weight



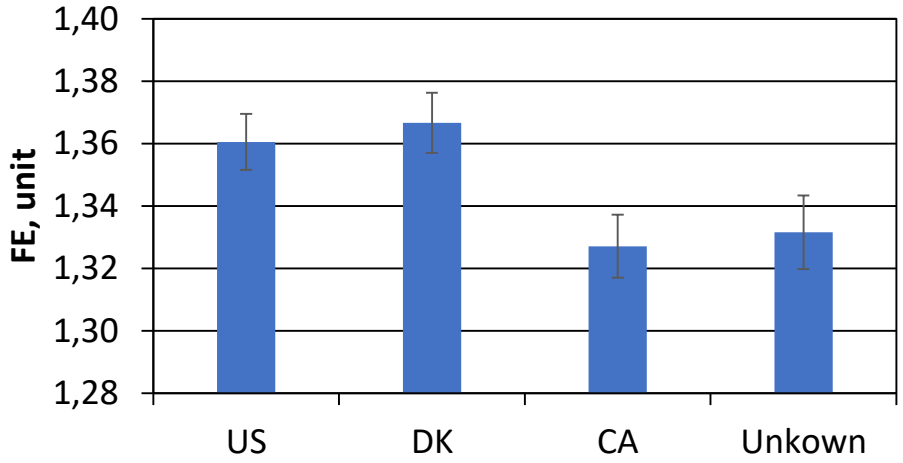
Fat Corrected Milk



Dry Matter Intake

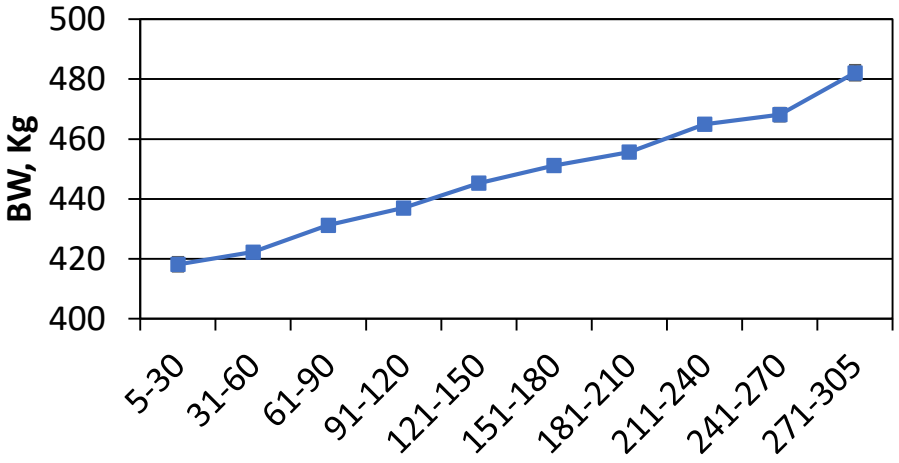


Feed Efficiency



Stage of Lactation Effect

Body Weight



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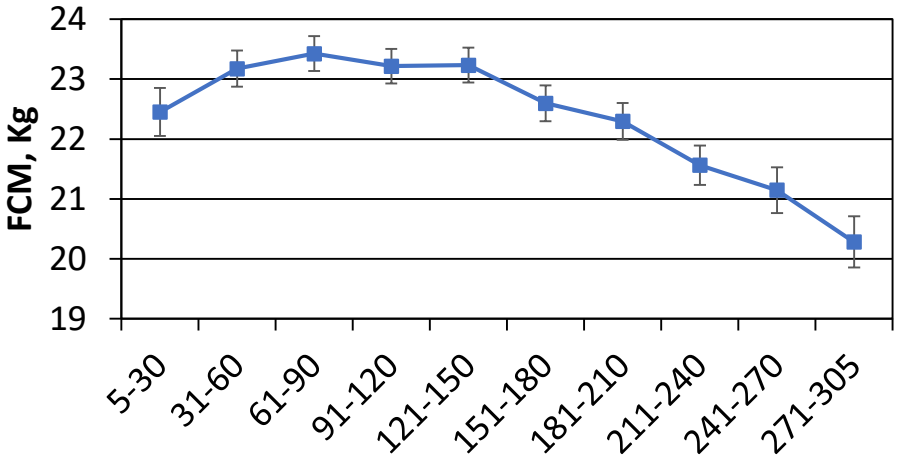

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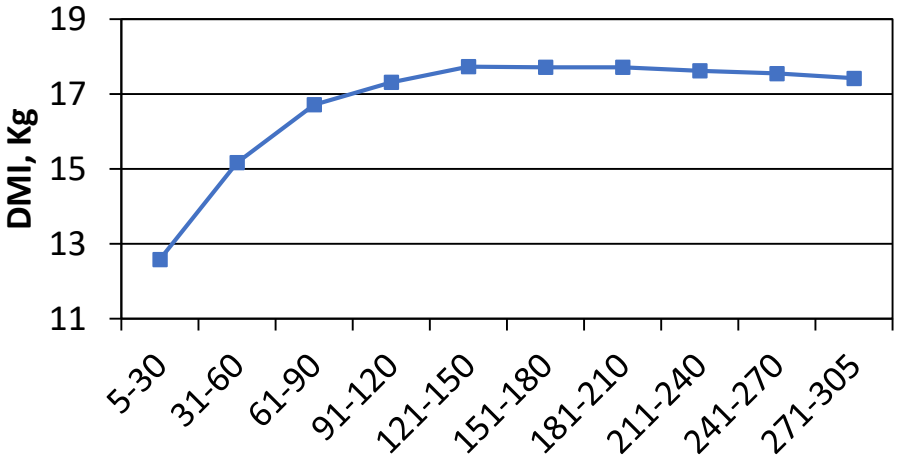

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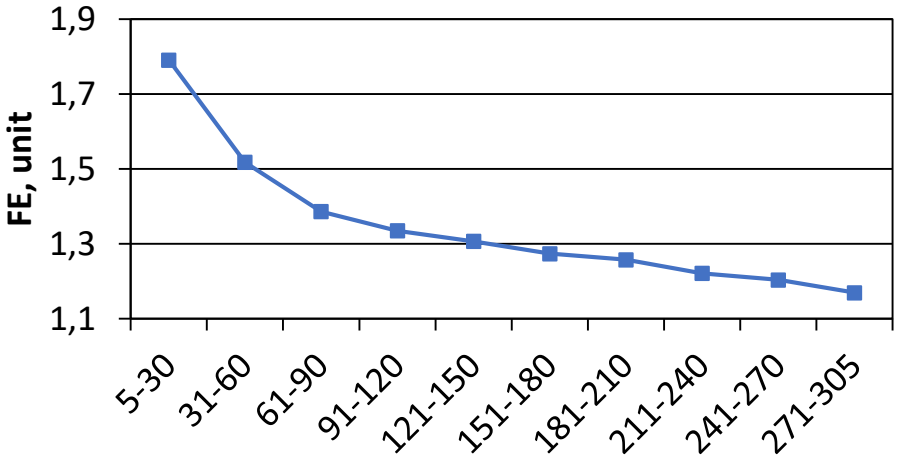
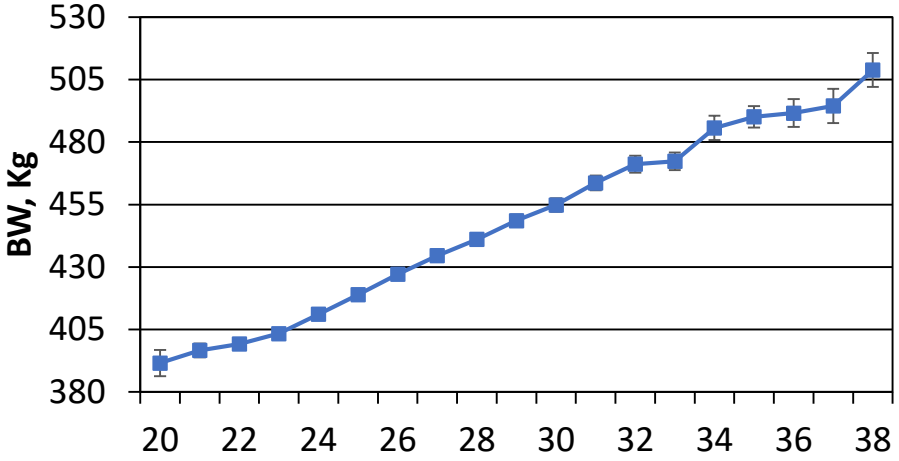
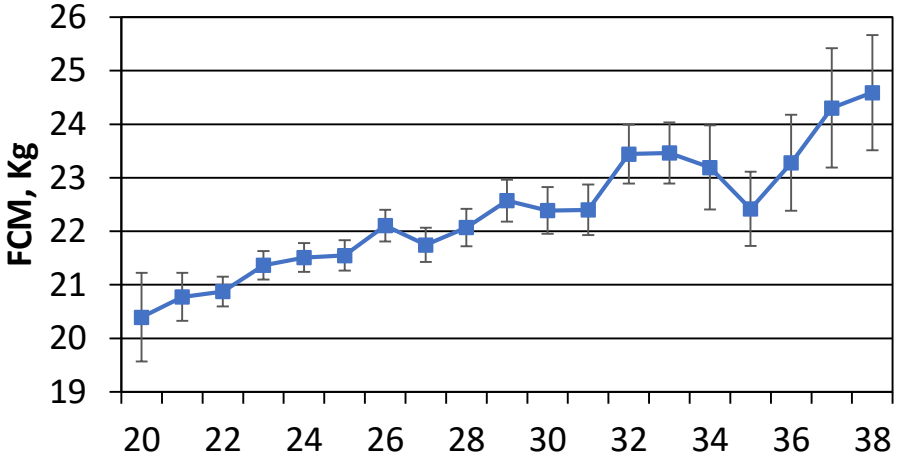


Age at First Calving Effect

Body Weight



Fat Corrected Milk



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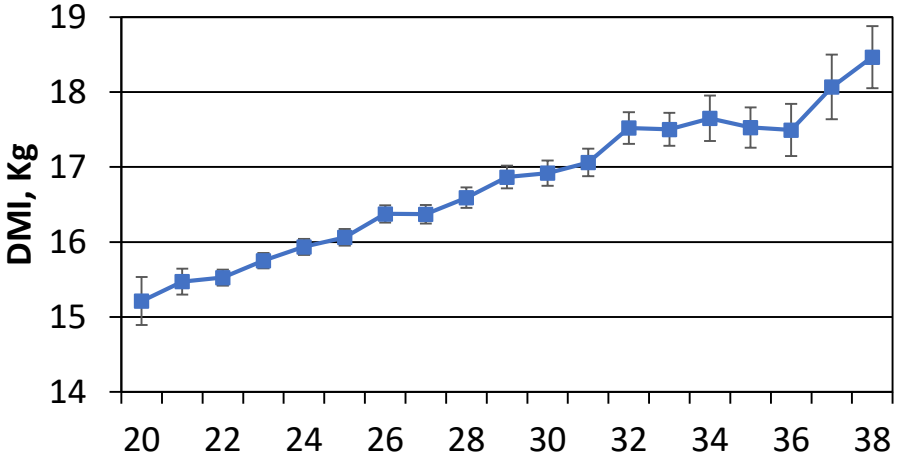

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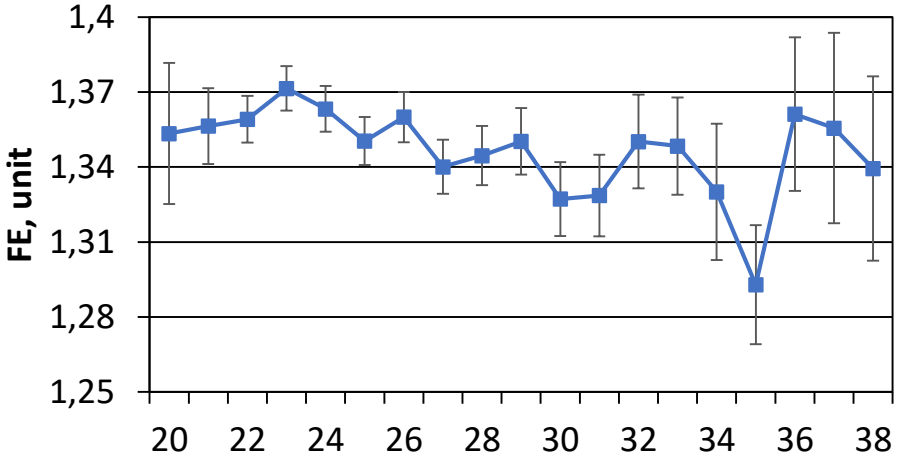

Take at Home Messages

- Factors identified 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?