



Healthy People, Healthy Cows

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Introduction

- Milk is a nutritious, healthy product
- Consumer demand shifting towards “lower fat” foods - dairy products under scrutiny
- Lots of questions being asked
 - Can we make milk “healthier”?
 - In doing so - what effects for the cow?
 - How do we know if milk being produced is healthier?
 - How do we know how “healthy” our cows are?

ANSWER: Mid-Infrared Spectrometry

Objective

Breed cows to produce healthier milk while ensuring that the cows producing the milk are themselves healthy using **mid-infrared spectrometry**



Healthier milk

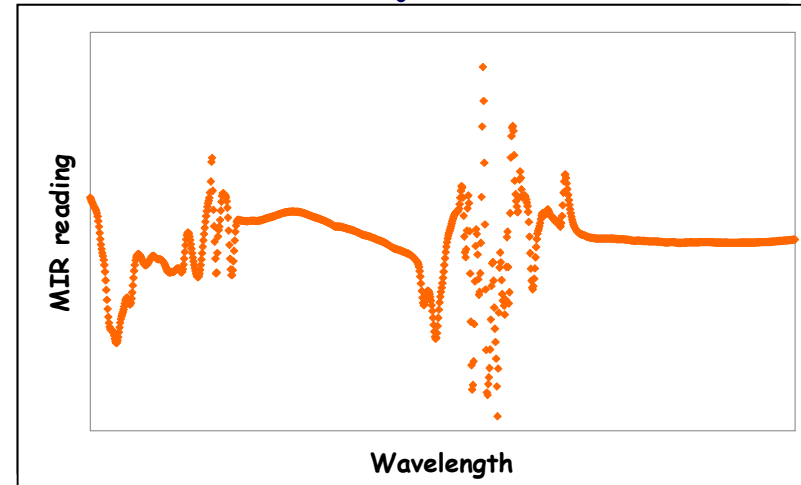
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Happy healthy cows

What is Mid-Infrared Spectrometry?

- Method of choice to determine fat, protein and lactose content of milk
- Milk recording procedure
 - Vial of milk taken from cow
 - Analysed by MIR machine
 - Light shone through sample
 - Absorbance light through the milk at different wavelengths = **Spectrum**
- Can we use the spectrum for more?
 - Eg. Milk fatty acid content



Why look at milk fatty acid content?

Saturated Fats

“bad fats”

Heart disease



Unsaturated Fats

“good fats”

Cholesterol reducing

- Would be preferable to have less saturates
- Irish cows more favourable milk FA profile
 - Grass fed, increased unsaturated fats

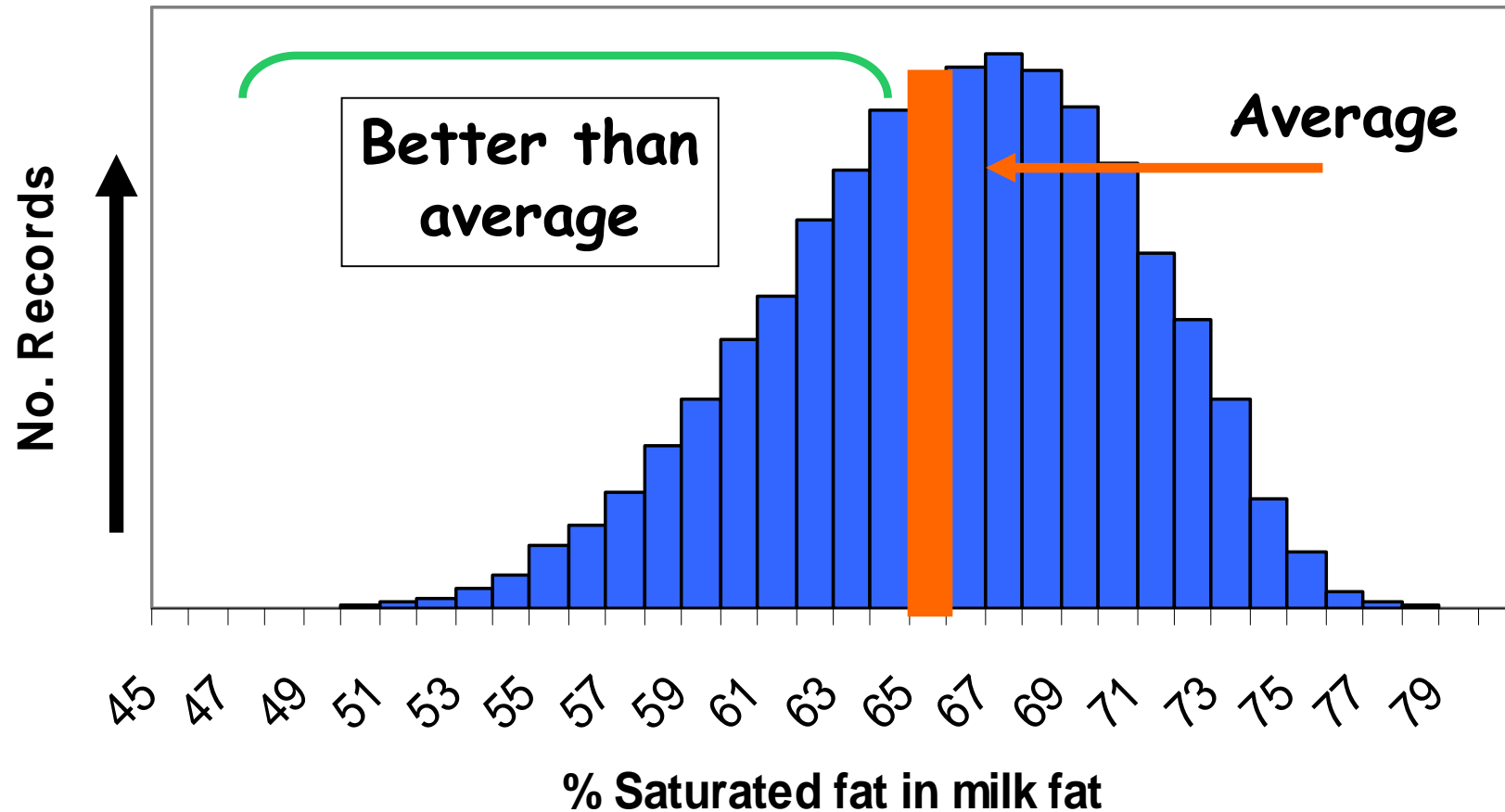
- How can we further improve this ratio?

One answer is through **GENETIC SELECTION**

What do we need to alter any trait through genetic selection?

1. Trait must be under genetic control
 - ✓ It is heritable - passed from parent to offspring
2. Must be variation in the population
3. Must be of economic importance
4. Must be measurable

Variation in Moorepark Curtains herd for % saturated fats in milk fat



What do we need to alter any trait through genetic selection?

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 - ✓ It is heritable - passed from parent to offspring
2. Must be variation in the population
 - ✓ Lots of different profiles in the population
3. Must be of economic importance
 - ✓ Adding value to the milk
4. Must be measurable
 - ✗ Fatty acid traditionally expensive & timely to measure

Using Mid-Infrared Spectrometry to predict fat composition

- Equations to predict fatty acids in the milk have been developed
 - Spectrum generated by the MIR machine
- Data from Ireland, Belgium and Scotland
 - Several breeds
 - Concentrate fed cows & grass fed cows

Tested on a group of randomly selected Irish cows - **98% accuracy** of predicting **saturated fats** in milk

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4. Must be measurable
 - ✓ Predicted using mid-infrared spectrometry

So we have all we need for breeding BUT . . .

- We must ensure that selection for a “healthier milk profile” will not impact on . . .
 - Other characteristics of the milk
 - Milk processing ability
 - Other characteristics of the cow
 - Health and fertility



Energy balance



Energy Balance

- Balance between energy input - energy output
- Associated with health & fertility
- Difficult to measure - intake, maintenance, weight
- **BUT**
 - Fat : Protein ratio a common indicator
 - Milk fatty acid content - possible indicator
 - Indicators predicted using MIR
 - Can MIR predict energy balance DIRECTLY?
- **YES**
 - Prediction equations produced similarly to other equations
 - Accuracy of predicting energy balance 75%
 - High accuracy of prediction not expected



To Conclude

- Accurate prediction of milk fatty acids using MIR
- Accurate prediction of energy balance using MIR
- MIR spectrum data collected routinely on large numbers of milk-recorded cows
- Use of MIR data to produce estimates of genetic merit for milk fatty acids is very promising
- More testing of associations with traits required
- Data collection of spectra on-going at Moorepark
- Co-ordinated nationwide data collected required



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<http://www.robustmilk.eu>