

Troubleshooting Problems with Low Milk Fat Test

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What are the Major Components of Milk?

- Water
- Lactose
- Fat
- Protein
- Other solids



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Why Monitor Milk Fat Content?

- Multiple component pricing system
 - \$11.85/kg fat vs. \$8.84/kg protein vs. \$1.32/kg other solids
- Quota is based on milk fat (kg) shipped
- Milk fat content most variable component
 - 3.0% units for fat vs. 0.60% units for protein
- Useful indicator of animal health
 - Rumen health
 - Risk for ketosis in early lactation cows

Monitoring Milk Fat Content

- Bulk tank fat test
 - Herd level
- DHI test day reports
 - Individual cow level

Milk Fat Content vs. Milk Fat Yield

- Pricing, quota based on kg of fat delivered
- Cow A: 40 kg/d milk @ 3.8% fat
 - Fat yield = $40 \times 3.8/100 = 1.52$ kg/d
- Cow B: 45 kg/d milk @ 3.4% fat
 - Fat yield = $45 \times 3.4/100 = 1.53$ kg/d

Do I Have a Problem with MFD?

- Herd or group fat test drops $\geq 0.3\%$ units from “normal” fat test over 2 or 3 consecutive tests indicates a problem
 - Inverted fat:protein ratio (1.2-1.3 typical)
- With a drop in milk fat test, is the drop in fat yield big enough to affect milk cheque?
- Is the drop in milk fat test a sustained trend or just part of normal variability?
- What is the reason for the drop in milk fat test?

Time Course of Induction and Recovery From MFD

- When MFD occurs, when did the problem originate?
 - 7-10 days to see MFD
- When problem is corrected, when will milk fat content improve?
 - 10-14 days to return to “normal” milk fat content

Many Factors Influence Milk Fat Content

NUTRITIONAL FACTORS

Level of forage
Level of fibre
Grain processing
Level of fat
Type of fat
Ionophores
Feeding strategy

MILK FAT

NON-NUTRITIONAL FACTORS

Genetics
Stage of lactation
Level of production
Season of year
Parity
Disease status
Milking technique

Factors Influencing Milk Fat Content

▪ Nutritional factors

- Poorly balanced diets and poor feeding management practices that disrupt rumen function can result in milk fat depression

What Causes MFD?

1. Increase C18 PUFA Precursors

Fatty acids

Linoleic acid
(*cis*-9, *cis*-12 18:2)



Rumenic acid
(*cis*-9, *trans*-11 CLA)

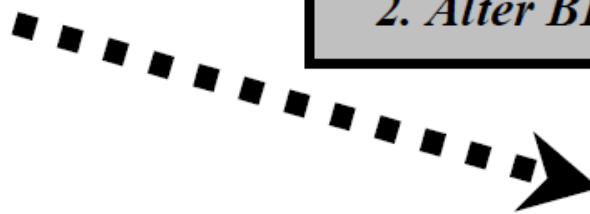


Vaccenic acid
(*trans*-11 18:1)



Stearic acid
(18:0)

2. Alter BH pathways



trans-10, *cis*-12 CLA



trans-10 18:1



Stearic acid
(18:0)

3. Alter rates of BH

Fat blockers



Lock, A. L. 2013. WCDS Proc. 25: 205

Infusion of Fat Blockers into the Abomasum

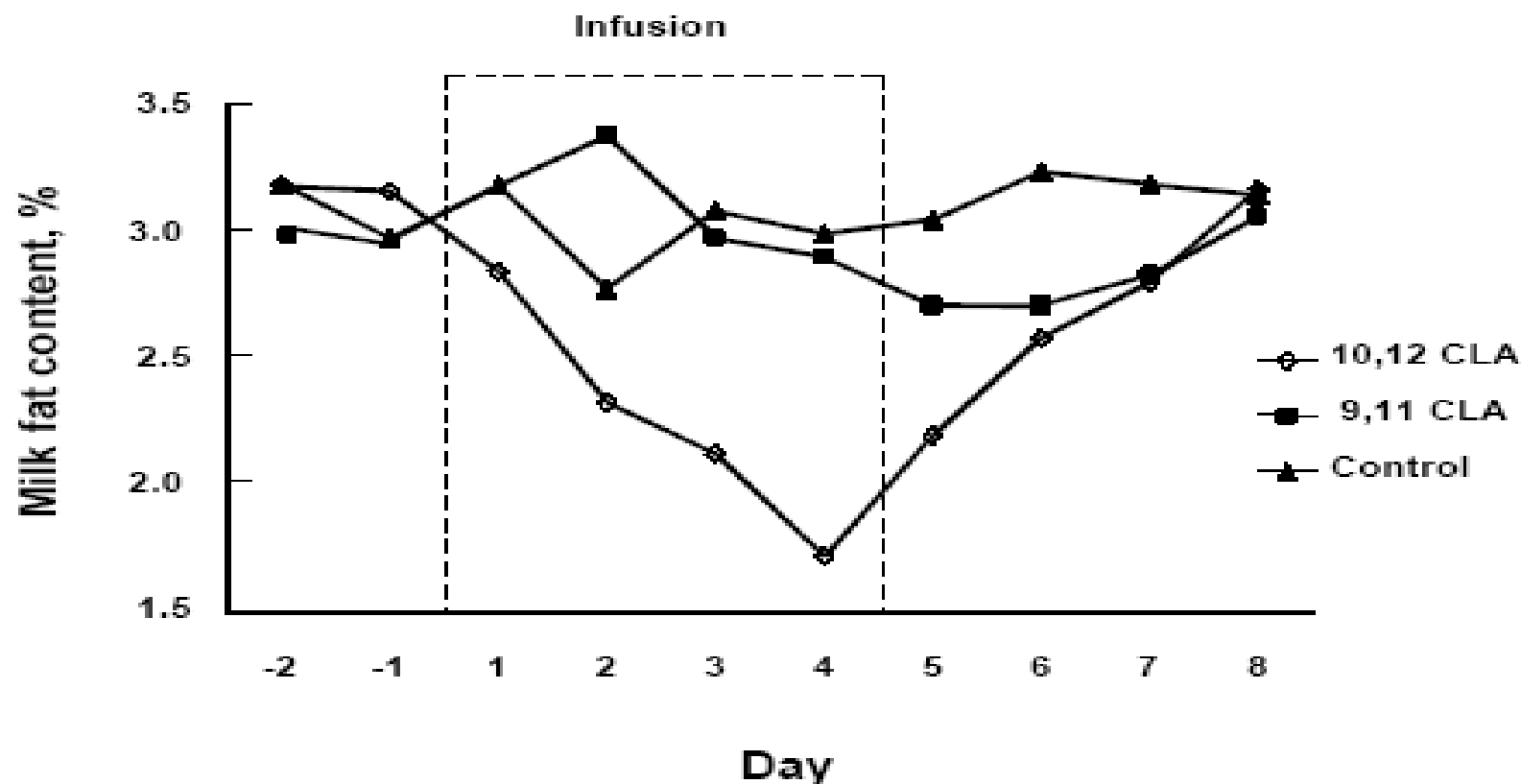
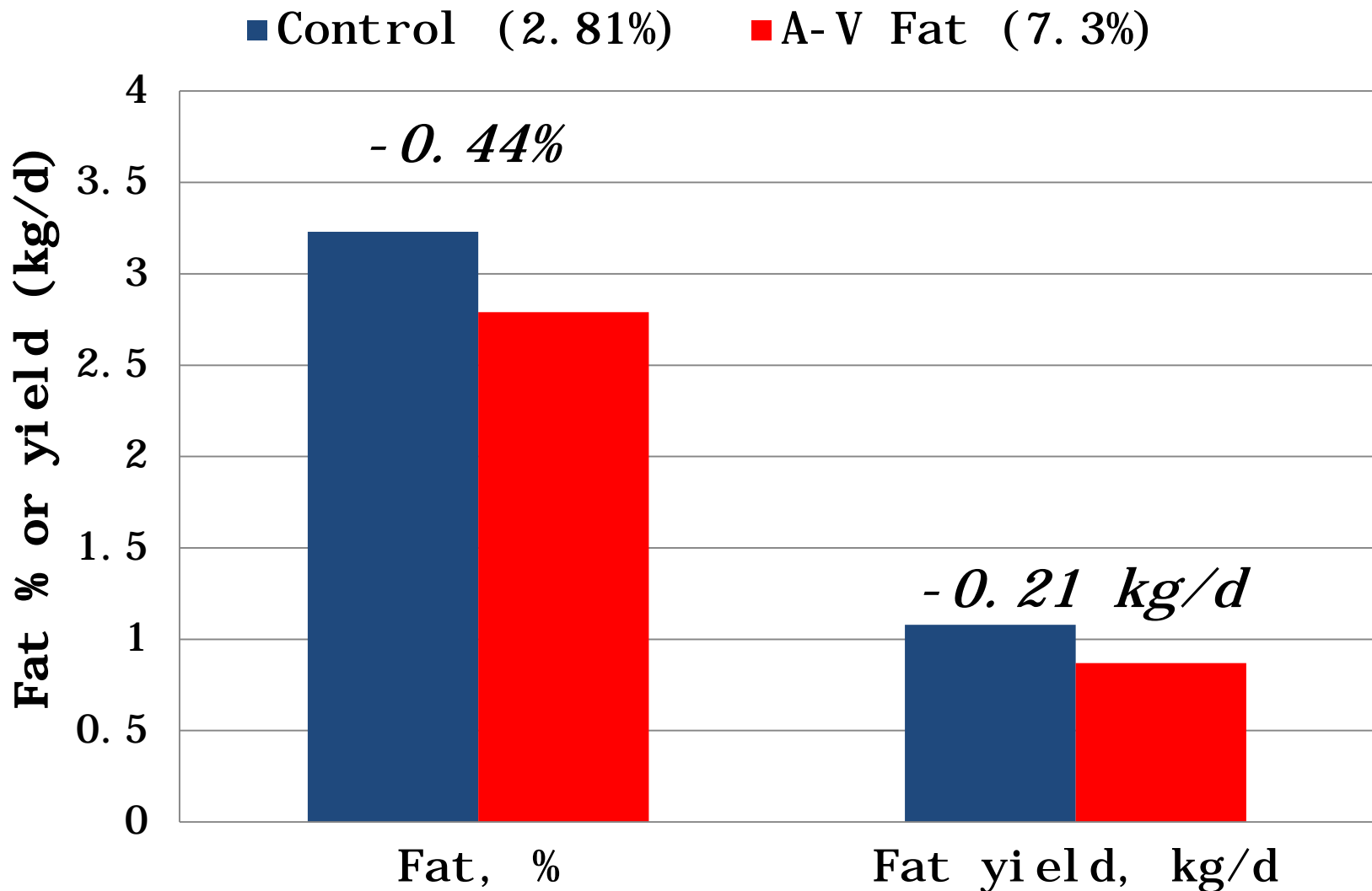


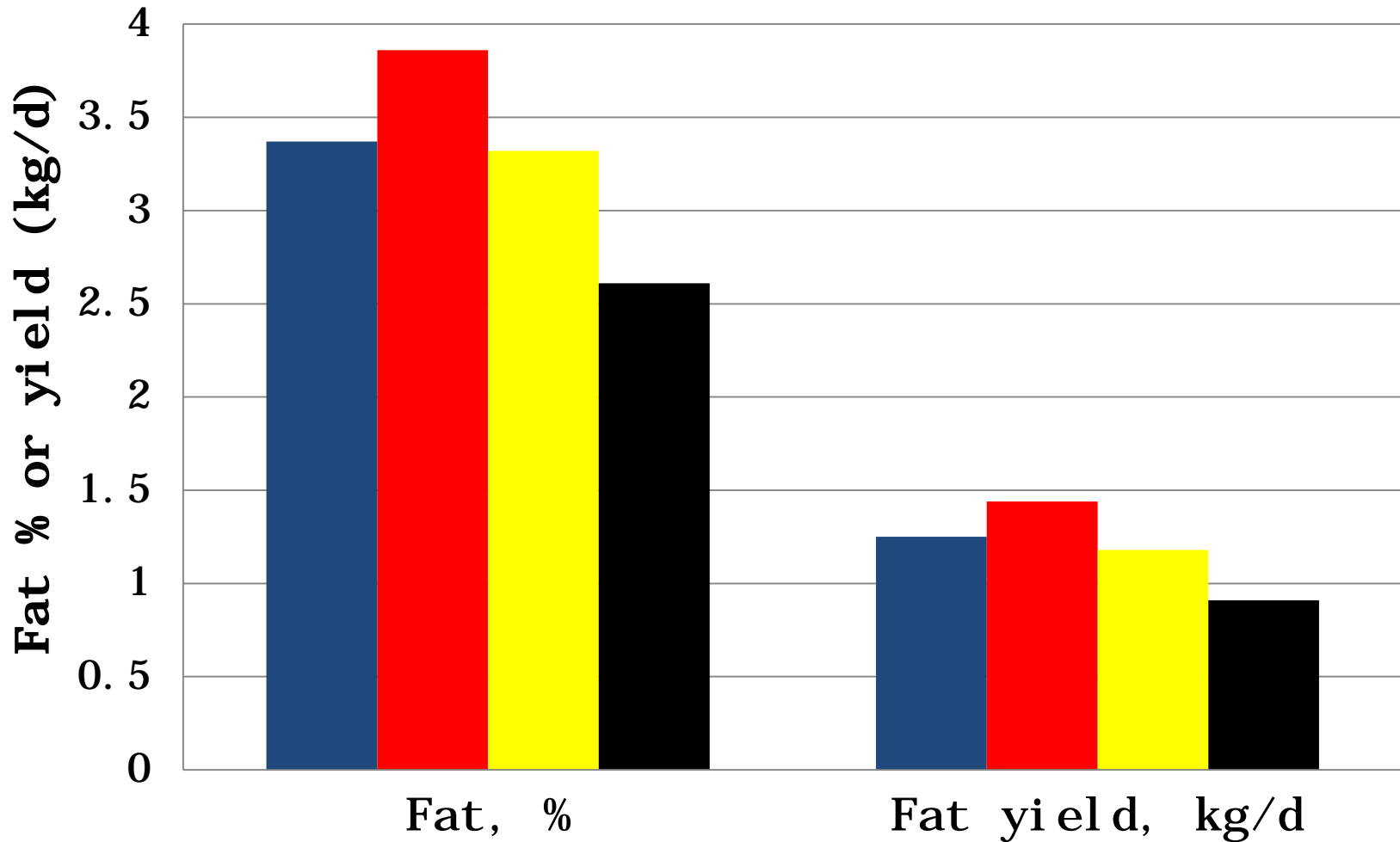
Figure 1. Temporal pattern of milk fat content during administration of two specific conjugated linoleic acid (CLA) isomers. Adapted from Baumgard et al., 2000

Excessive Dietary Fat Induces MFD



Some Types of Dietary Fat Induce MFD

■ Control ■ SFA ■ MUFA ■ PUFA



Fatty Acid Composition of Typical Feeds

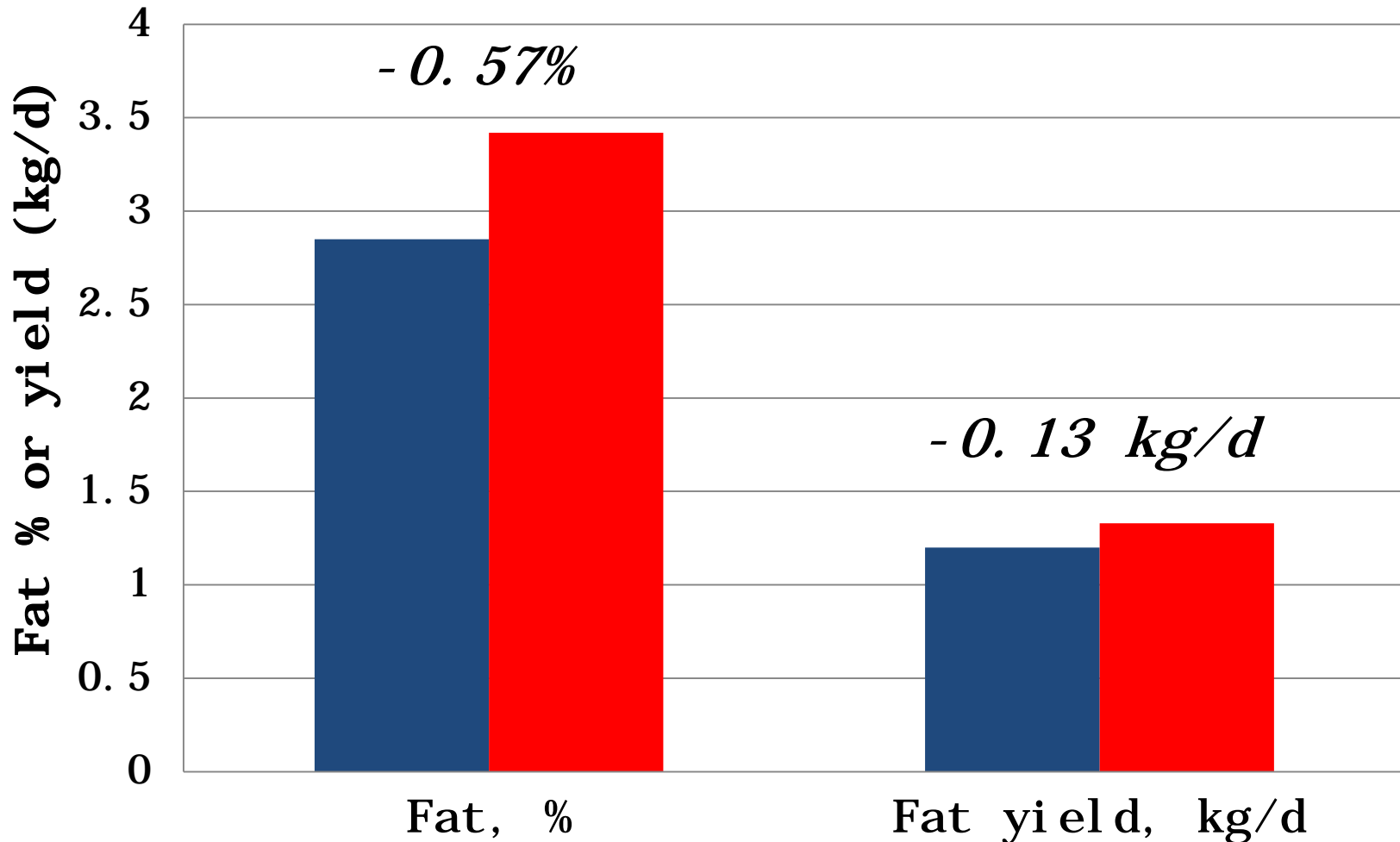
Feed name	Fatty acid, g/100 g total fatty acids					
	C16:0 Palmitic	C18:0 Stearic	C18:1 Oleic	C18:2 Linoleic	C18:3 Linolenic	Total UFA
Corn silage	17.83	2.42	19.24	47.74	8.25	75.23
Barley silage	43.40	4.10	7.30	12.3	2.40	22.0
Alfalfa silage	18.81	3.35	2.05	15.91	38.71	56.67
Alfalfa hay	25.01	4.01	2.43	18.49	36.79	57.71
Corn grain	13.21	1.99	24.09	55.70	1.62	81.41
Barley grain	22.97	1.53	13.54	55.93	4.34	73.81
Tallow (beef)	24.43	17.92	41.62	1.09	0.53	43.24
Canola oil	4.36	2.05	57.28	18.99	7.64	83.91
Flax oil	5.74	4.30	18.88	14.15	55.95	88.98
Soybean oil	10.83	3.89	22.82	53.75	8.23	84.80
Corn distillers grains	14.05	2.39	24.57	56.11	1.68	82.36

Excessive Fat or Oil Intake Induces MFD

- Check your total dietary fat
- Total dietary fat should not exceed 6%
 - Normal diet contains 2-3% total fat
 - Can add 2-3% supplemental fat
 - 6 to 7% total fat if adding bypass fats
- Type of added fat important
 - PUFA (linoleic acid) most damaging
 - Canola, flax, sunflower etc.

High Concentrate/Low Forage Intake

■ 45: 55 ■ 55: 45



Forage Intake and Ration Fibre are Important

- Low forage intake induces MFD
 - Forage intake >45% of ration DM
 - >1.4% of BW
 - Forage moisture content
- Low fibre intake induces MFD
 - 30-34% NDF in TMR
 - Minimum 1.1-1.2% total NDF intake as % of BW
 - Minimum 0.85% forage NDF intake as % of BW
- Ration particle size
 - Cannot be too fine or too coarse
 - Physically-effective fibre (peNDF)

Check TMR Particle Size



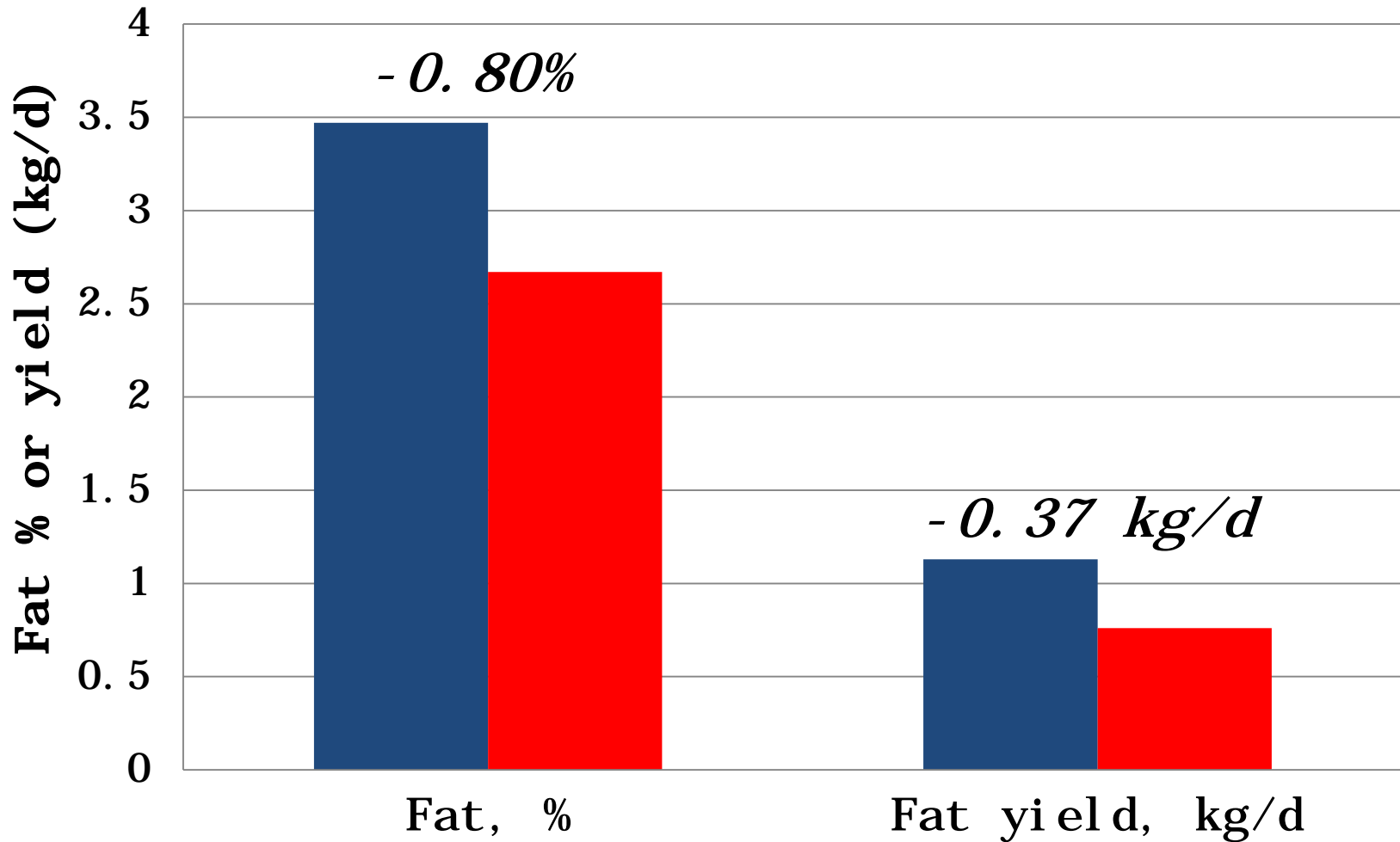
- Check what cows are actually consuming

Forage and TMR Particle Size Recommendations

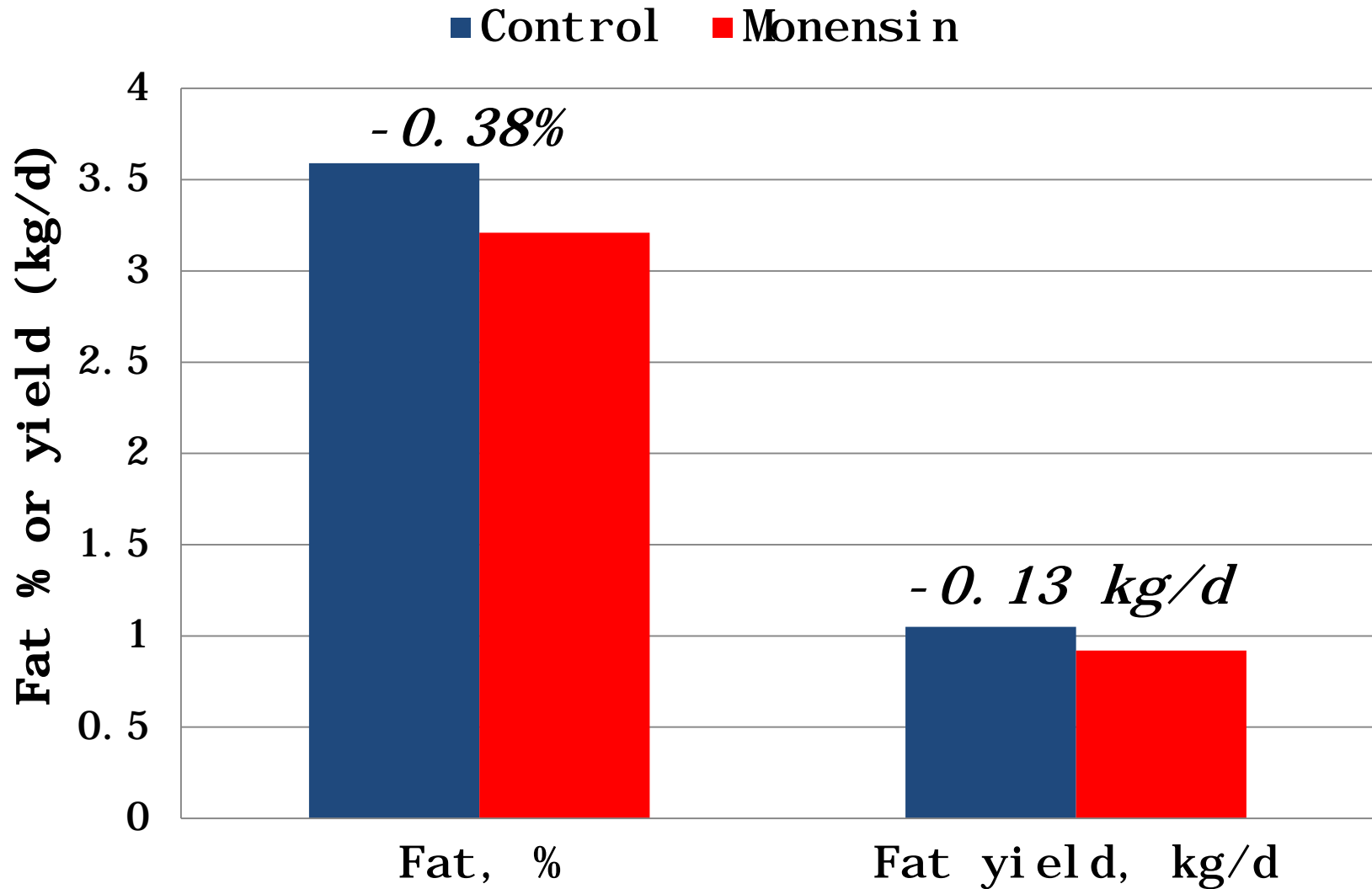
Screen	Pore Size (inches)	Particle Size (inches)	Corn Silage (% of total weight)	Haylage (% of total weight)	TMR (% of total weight)
Upper Sieve	0.75	> 0.75	3 to 8	10 to 20	2 to 8
Middle Sieve	0.31	0.31 to 0.75	45 to 65	45 to 75	30 to 50
Lower Sieve	0.16	0.16 to 0.31	20 to 30	30 to 40	10 to 20
Bottom Pan	N/A	< 0.16	< 10	< 10	30 to 40

Grain (Barley) Processing

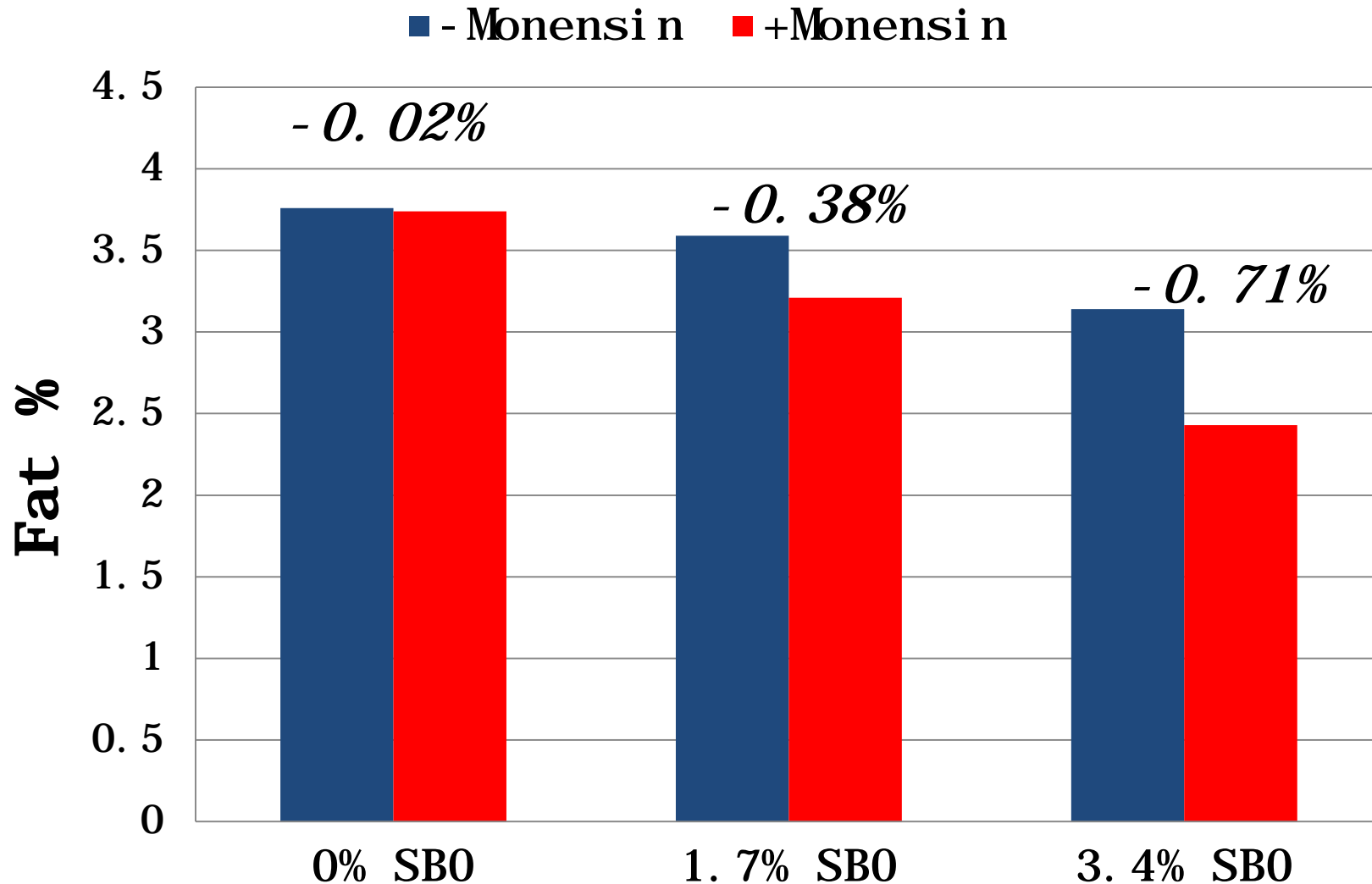
■ Dry-rolled ■ Pelleted



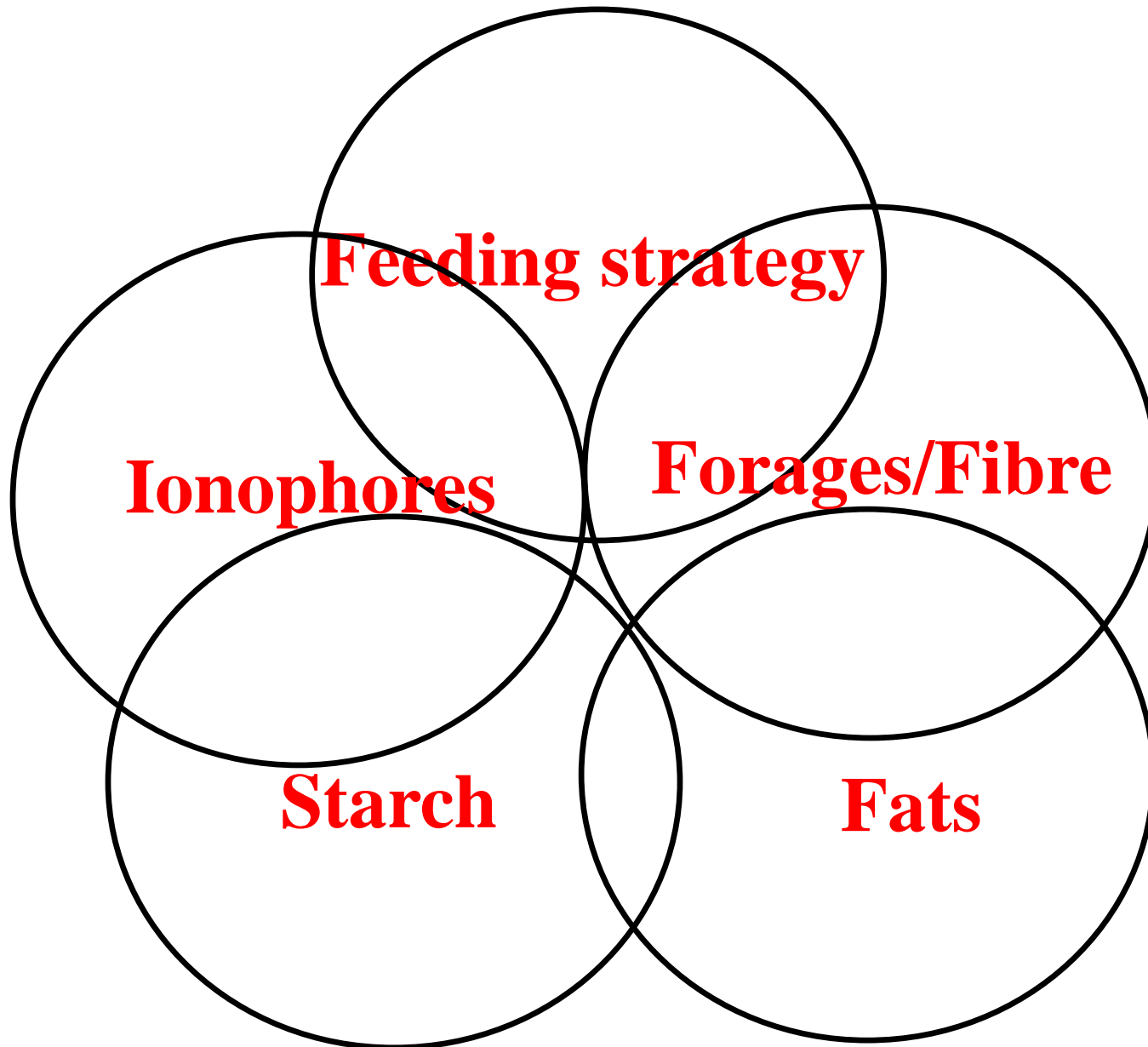
Feeding Monensin Induces MFD



Feeding Monensin + PUFA Induces MFD



Factors Interact to Induce MFD



Take-Home Messages

- Milk fat is most variable component
- Diet and feeding management factors are the most important factors influencing milk fat content
- Fatty acid composition of the diet is important
- Low milk fat tests typically arise as a result of interactions among dietary and feeding management factors