OPTIMUM INCLUSION LEVELS FOR CAMELINA MEAL IN DAIRY COW DIETS

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Production of *Camelina sativa*

- Oilseed crop belonging to Brassica family

- Acreage under Camelina expanding in the prairies
  - 5,000 acres in SK for 2017
  - 10,000 acres predicted in SK for 2018 (Arnason 2017; The Western Producer)

- 30-45% oil content

www.oilseedcrops.org/camelina

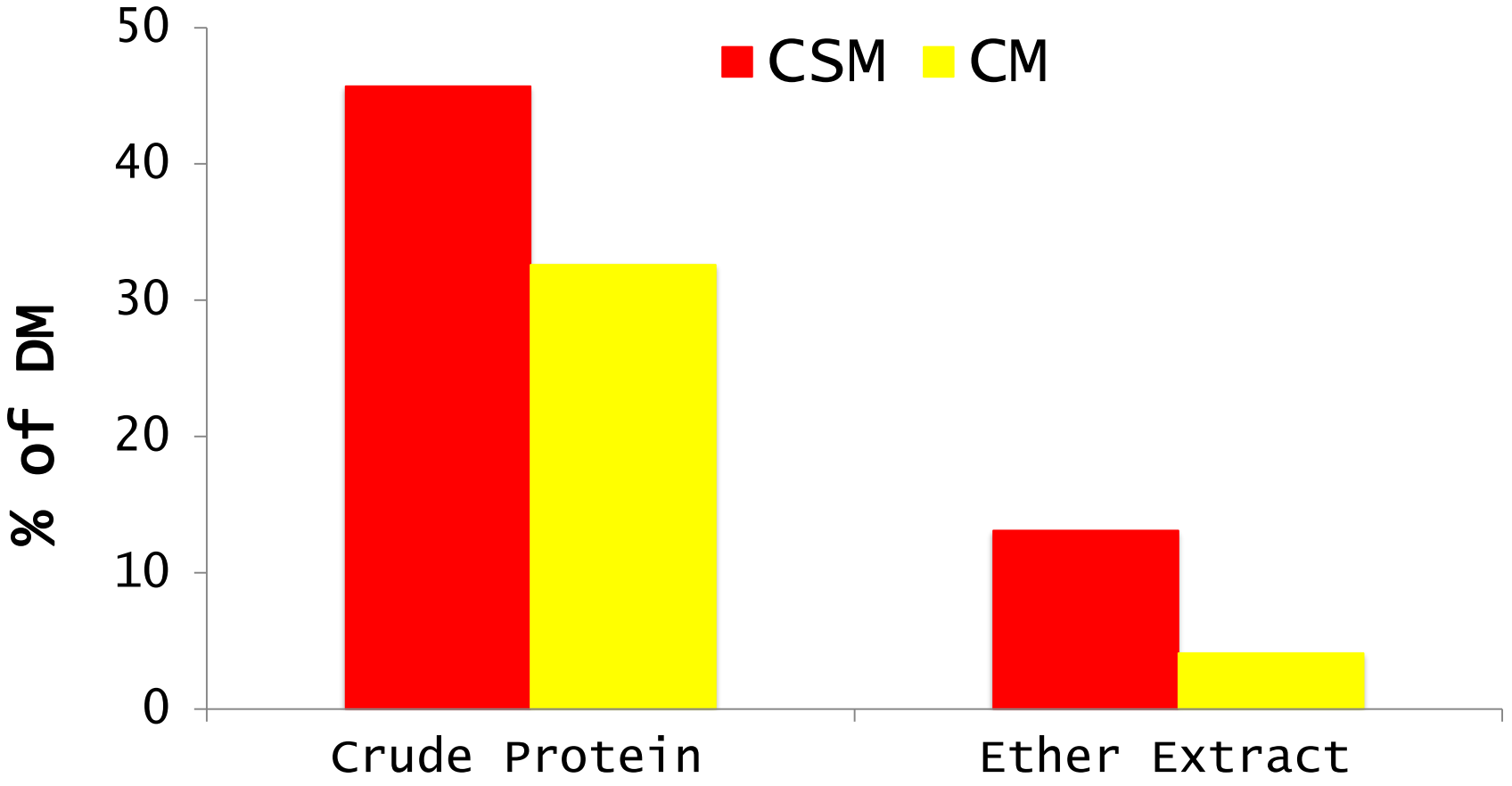
What is *Camelina sativa* meal (CSM)?

90%
Oil

=

www.oilseedcrops.org/camelina

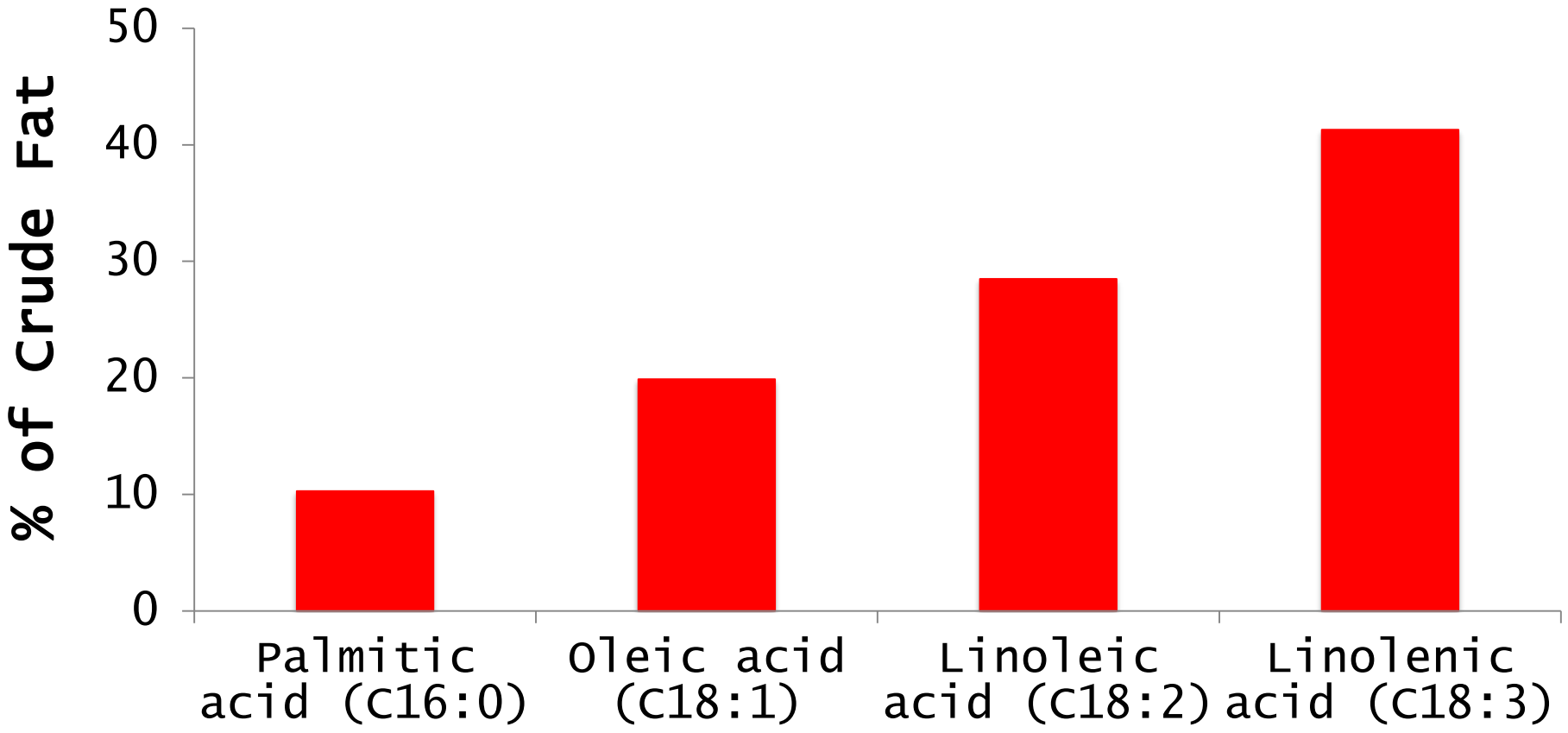
CSM as a Protein Source in Feed



- CSM contains more lysine than CM
- CSM contains more residual fat than CM – can increase caloric density of diet

Colombini et al. (2014)

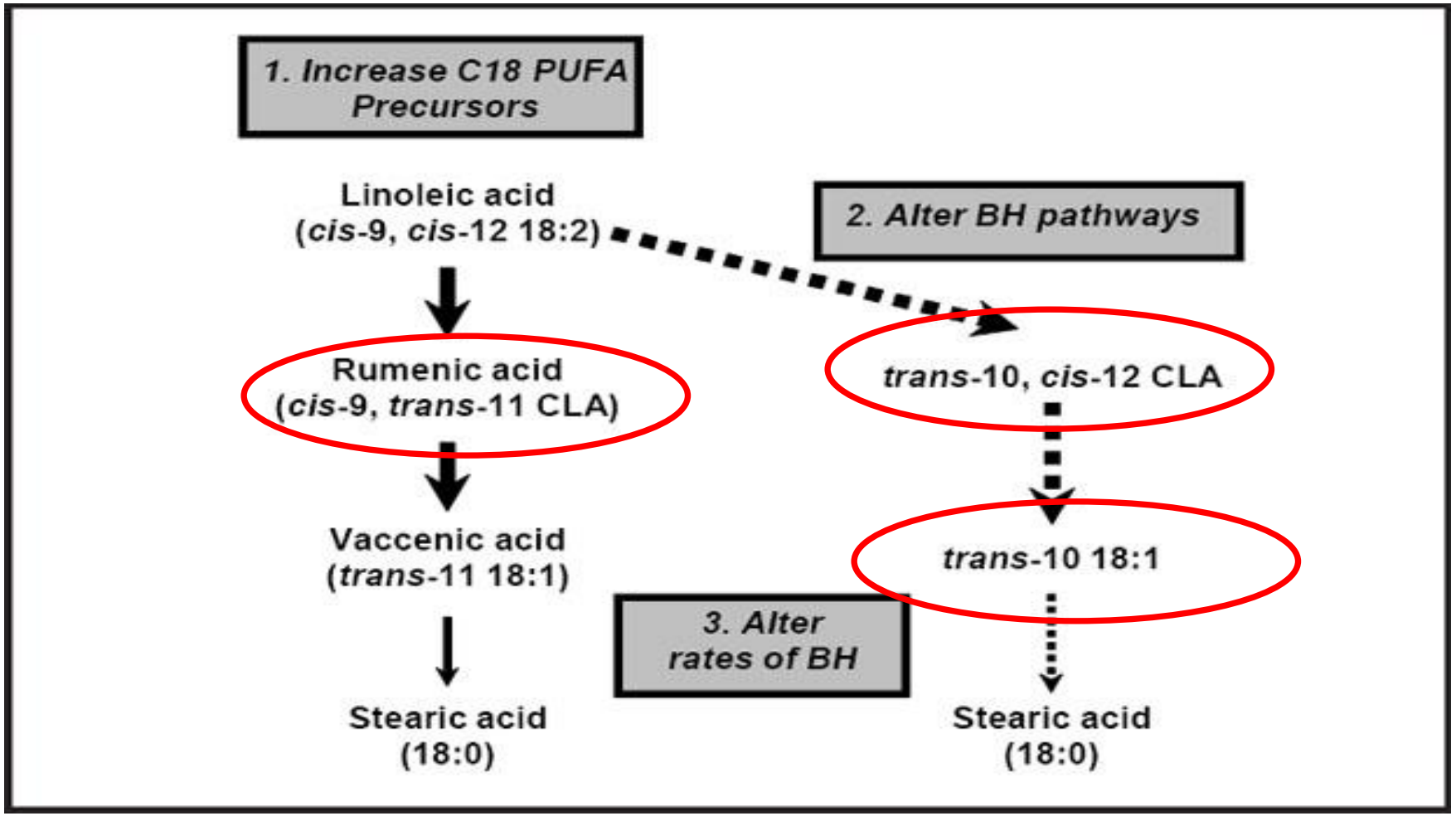
Fatty Acid Profile of CSM



- Largely unsaturated oil (>90%)

Hurtaud and Peyraud (2007)

Rumen Biohydrogenation Intermediates



Anti-Nutritional Factors (ANF) of CSM

- Glucosinolates, sinapine, erucic acid, trypsin inhibitors
- Oil extraction concentrates ANF in CSM
- Could have potential negative effects on feed digestion and animal health
- Need to determine a safe inclusion level for CSM in dairy cow diets

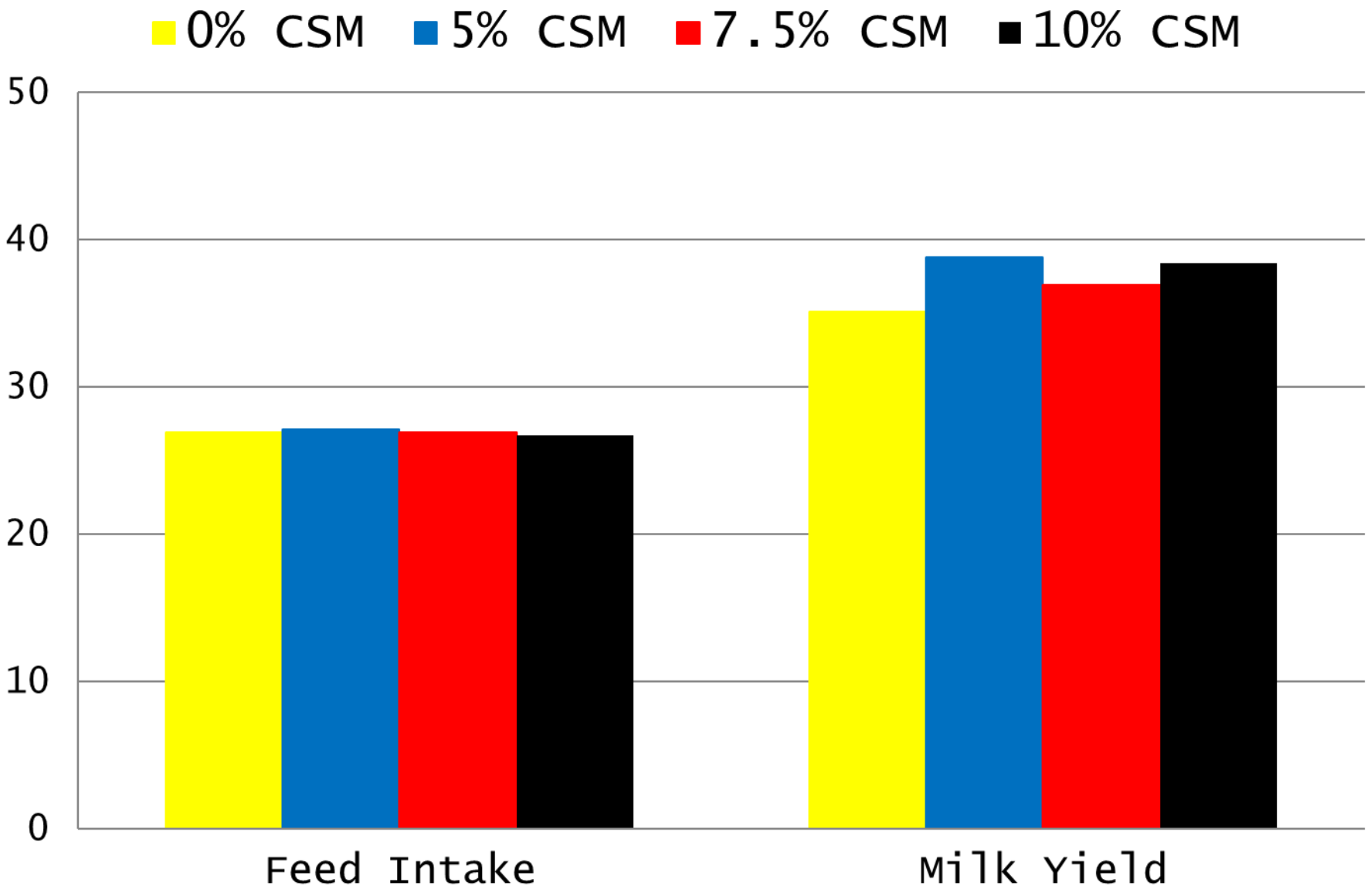
Diets – Experiment 1

Item	Experimental Diets			
	0% CSM	5% CSM	7.5% CSM	10% CSM
Feed ingredients, % of DM				
Barley silage	31.6	31.6	31.6	31.6
Alfalfa hay	14.0	14.0	14.0	14.0
Barley grain	24.2	24.2	24.2	24.2
Canola meal	**17.6**	**12.5**	**10.0**	**7.5**
Camelina meal (CSM)	**0**	**5.02**	**7.51**	**10.0**
Corn gluten meal	0.04	0.04	0.04	0.04
Soybean meal	0.04	0.04	0.04	0.04
Soybean hulls	4.04	4.04	4.04	4.04
Cottonseed hulls	3.51	3.51	3.51	3.51
Oat hulls	1.4	1.4	1.4	1.4
Molasses (dried)	1.05	1.05	1.05	1.05
Potassium magnesium sulfate	0.14	0.14	0.14	0.14
Limestone	0.18	0.18	0.18	0.18
Sodium Bicarbonate	0.78	0.78	0.78	0.78
Mineral-vitamin premix	1.4	1.4	1.4	1.4
Salt	0.37	0.37	0.37	0.37

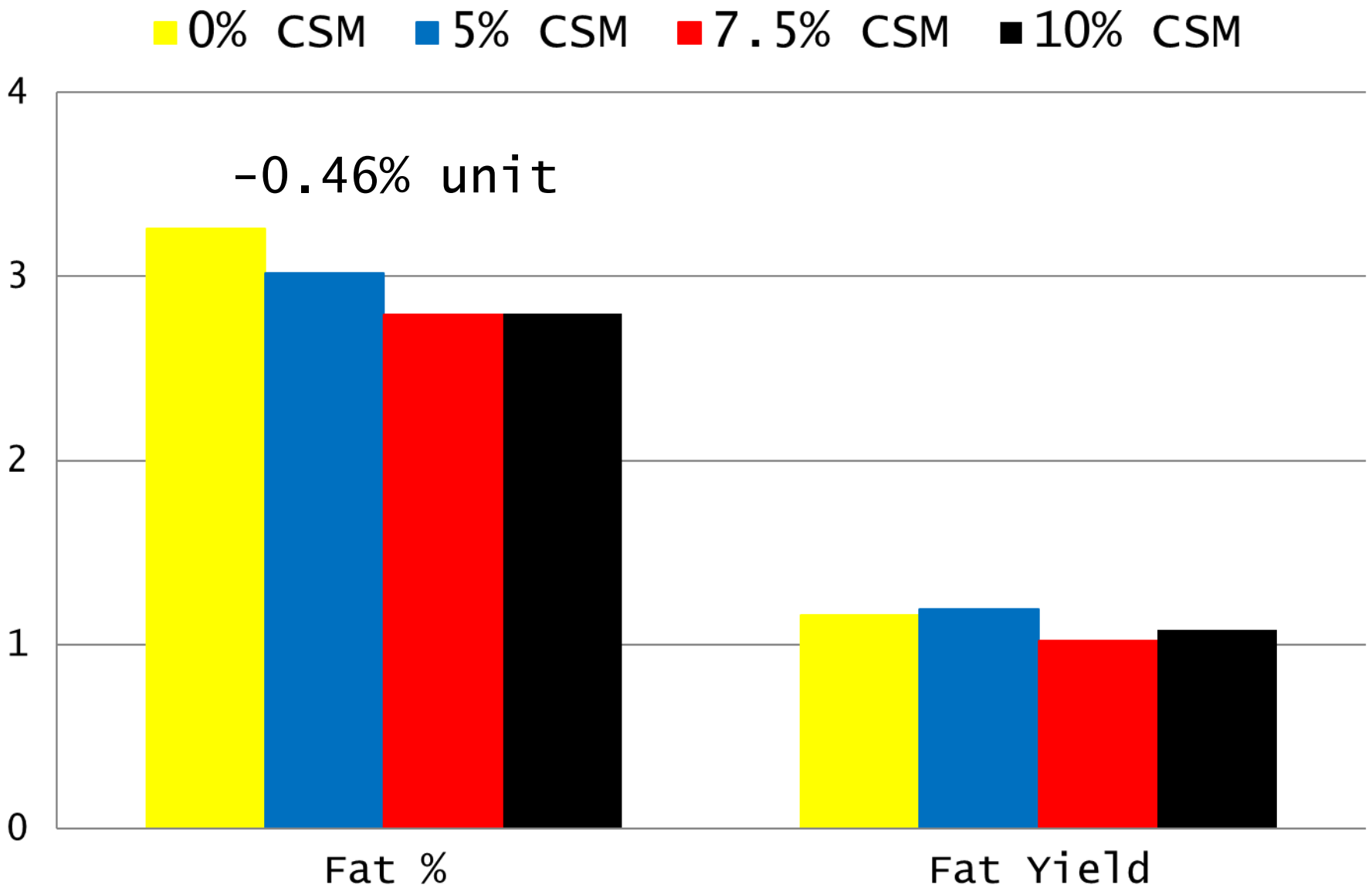
Diet Composition – Experiment 1

Item	Experimental Diets			
	0% CSM	5% CSM	7.5% CSM	10% CSM
Dry Matter, %	60.4	61.4	61.0	61.2
Crude protein, % of DM	**18.1**	**17.8**	**17.9**	**17.6**
Soluble protein, % of DM	4.83	4.80	5.0	5.33
NDF, % of DM	37.6	37.2	37.6	37.4
ADF, % of DM	24.6	25.2	25.0	25.1
Crude fat, % of DM	**2.02**	**2.39**	**2.65**	**2.78**
Starch, % of DM	21.8	20.8	20.4	20.6
Ash, % of DM	8.48	8.37	9.18	8.48
Ca, % of DM	0.99	1.02	1.06	0.98
P, % of DM	0.51	0.48	0.49	0.48

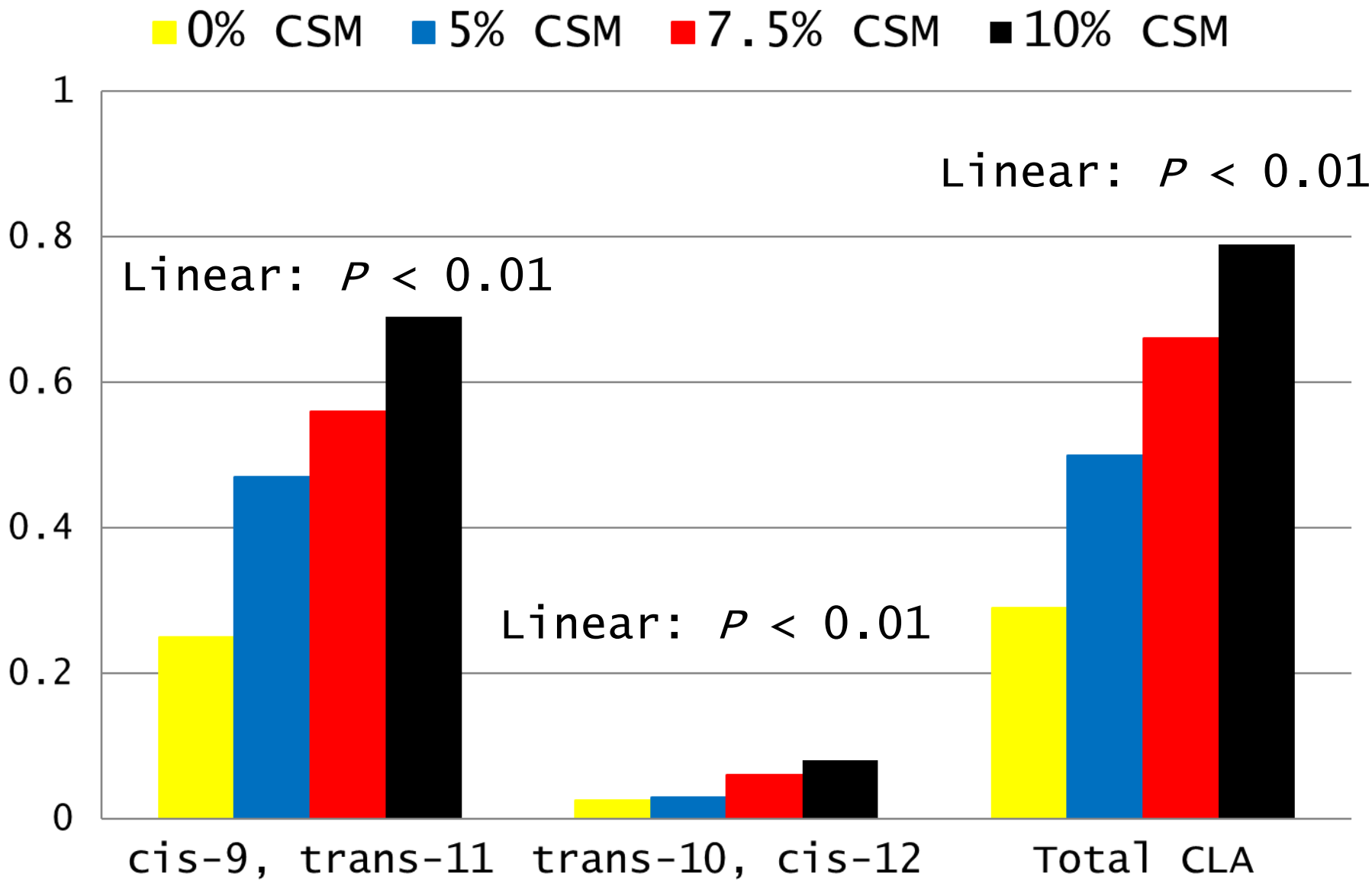
Feed Intake and Milk Yield (kg/d) – Experiment 1



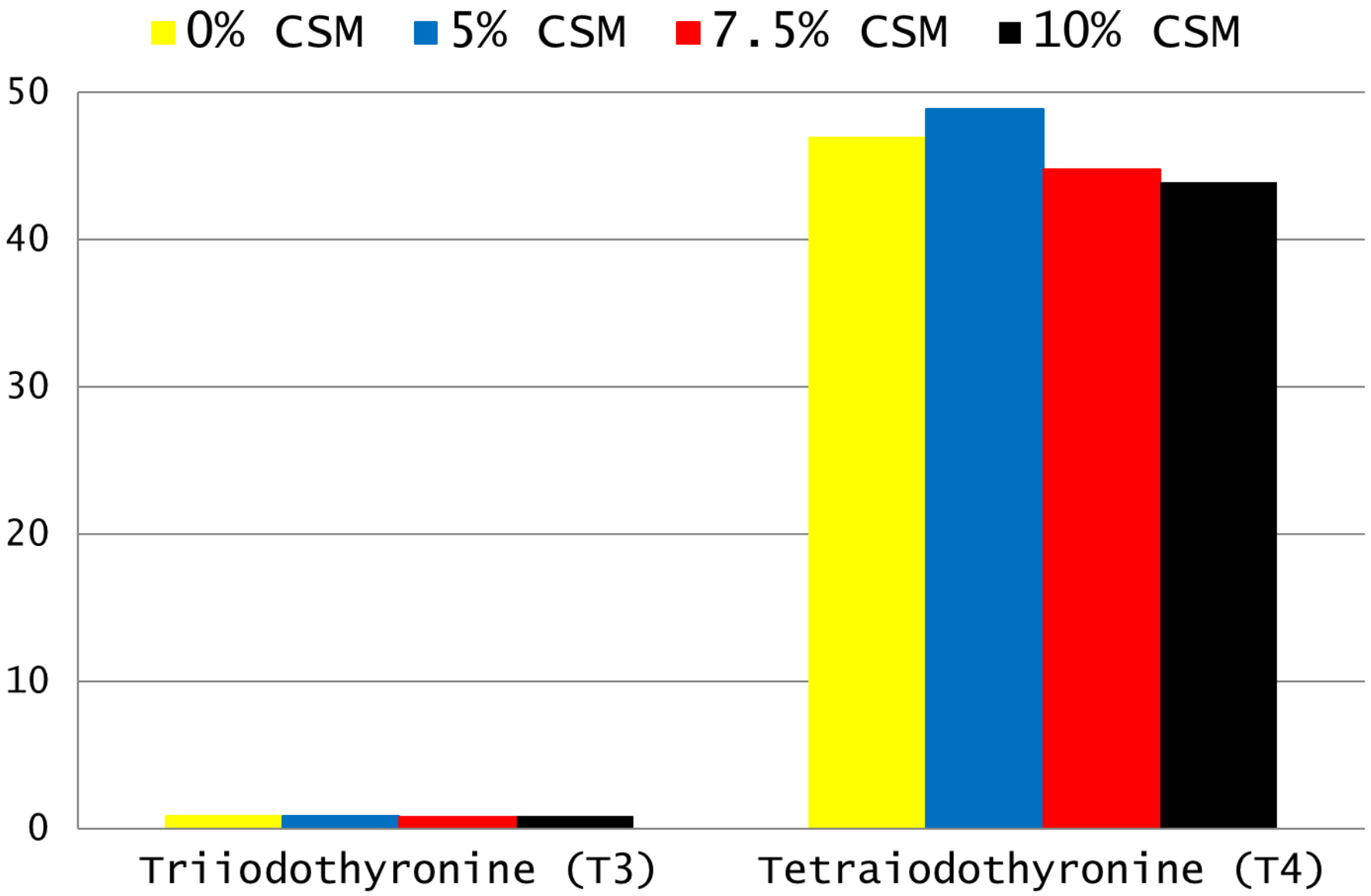
Milk Fat Content (%) and Yield (g/d)-Experiment 1



Conjugated Linoleic Acid (CLA) (%) - Experiment 1



Thyroid Hormone Levels (nmol/L) – Experiment 1



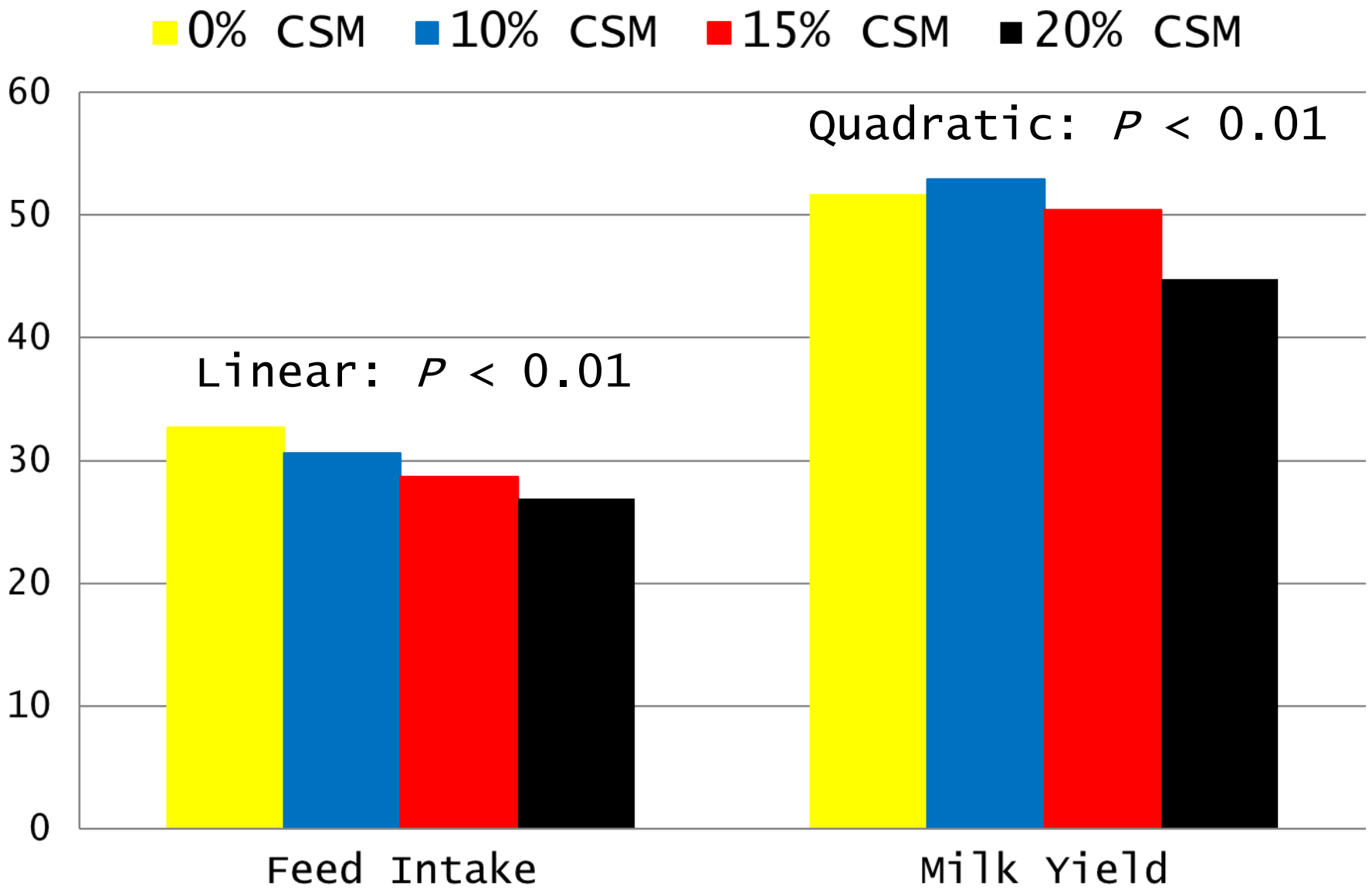
Diets – Experiment 2

Item	Experimental Diets			
	0% CSM	10% CSM	15% CSM	20% CSM
Feed ingredients, % of DM				
Barley silage	31.0	31.1	31.1	31.1
Alfalfa hay	13.2	13.2	13.2	13.2
Barley grain	24.6	24.7	24.7	24.7
Canola meal	**20.0**	**10.1**	**5.0**	**0**
Camelina meal (CSM)	**0**	**10.1**	**15.1**	**20.1**
Corn gluten meal	0.040	0.14	0.14	0.11
Soybean meal	0.04	0.29	0.29	0.11
Soybean hulls	0.36	0.36	0.36	1.07
Cottonseed hulls	5.70	0.72	0.72	5.36
Oat hulls	1.07	5.37	5.37	0.36
Molasses (dried)	1.07	1.07	1.07	1.07
Potassium magnesium sulfate	0.14	0.14	0.14	0.14
Limestone	0.18	0.18	0.18	0.18
Sodium Bicarbonate	0.79	0.79	0.80	0.79
Mineral-vitamin premix	1.43	1.43	1.43	1.43
Salt	0.37	0.37	0.37	0.37

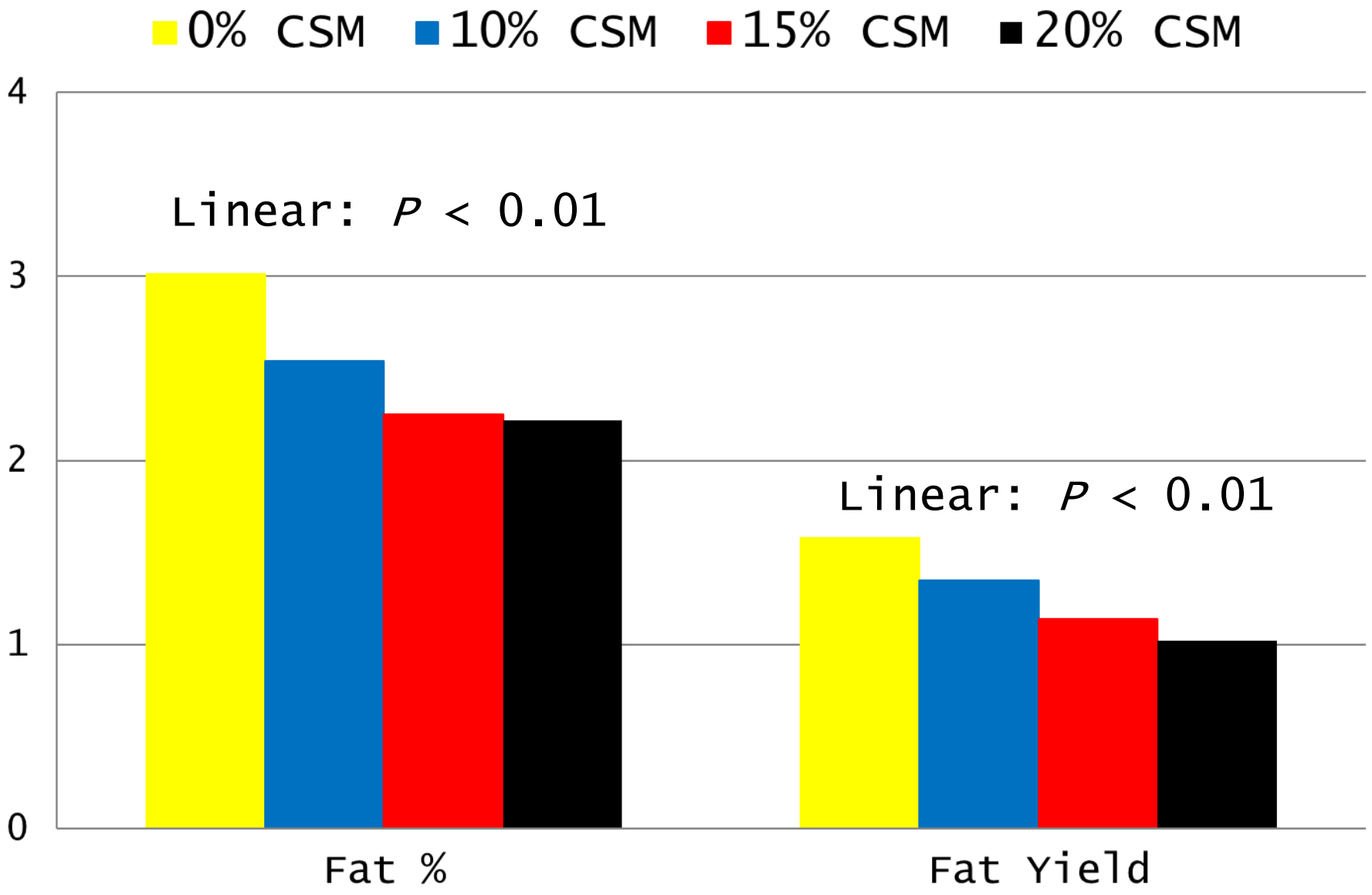
Diet Composition – Experiment 2

Item	Experimental Diets			
	0% CSM	10% CSM	15% CSM	20% CSM
Dry Matter, %	64.9	64.8	64.9	64.8
Crude protein, % of DM	**17.2**	**16.9**	**17.2**	**17.0**
NDF, % of DM	34.2	33.5	33.5	34.0
ADF, % of DM	23.8	22.2	22.2	23.3
Crude fat, % of DM	**2.86**	**3.82**	**4.11**	**4.62**
Starch, % of DM	23.7	23.8	23.1	22.1
Ash, % of DM	8.85	9.12	8.97	9.48
Ca, % of DM	0.87	0.86	0.87	0.88
P, % of DM	0.56	0.54	0.56	0.54

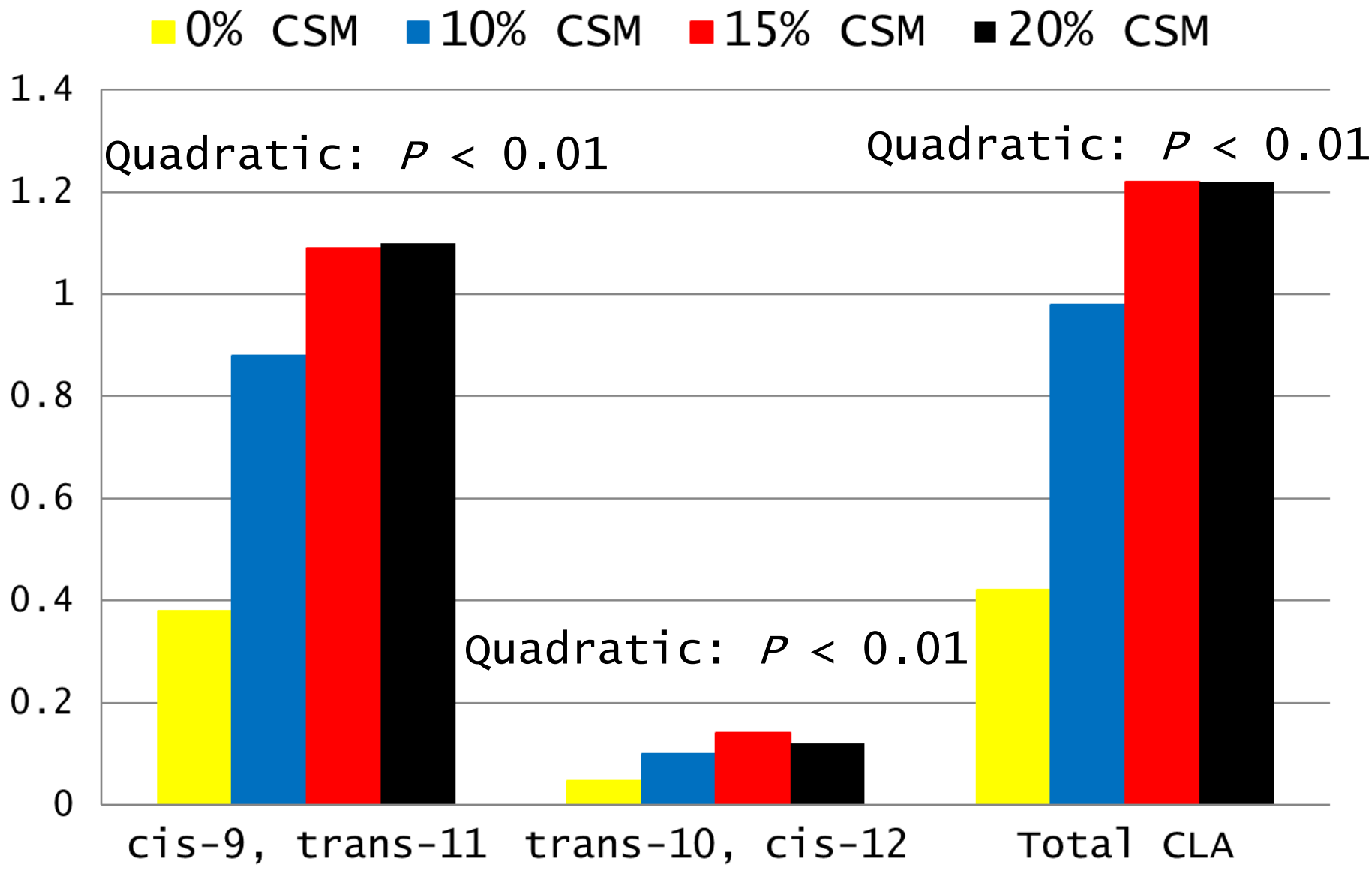
Feed Intake and Milk Yield (kg/d) – Experiment 2



Milk Fat Content (%) and Yield (g/d)-Experiment 2



Conjugated Linoleic Acid (CLA) (%) - Experiment 2



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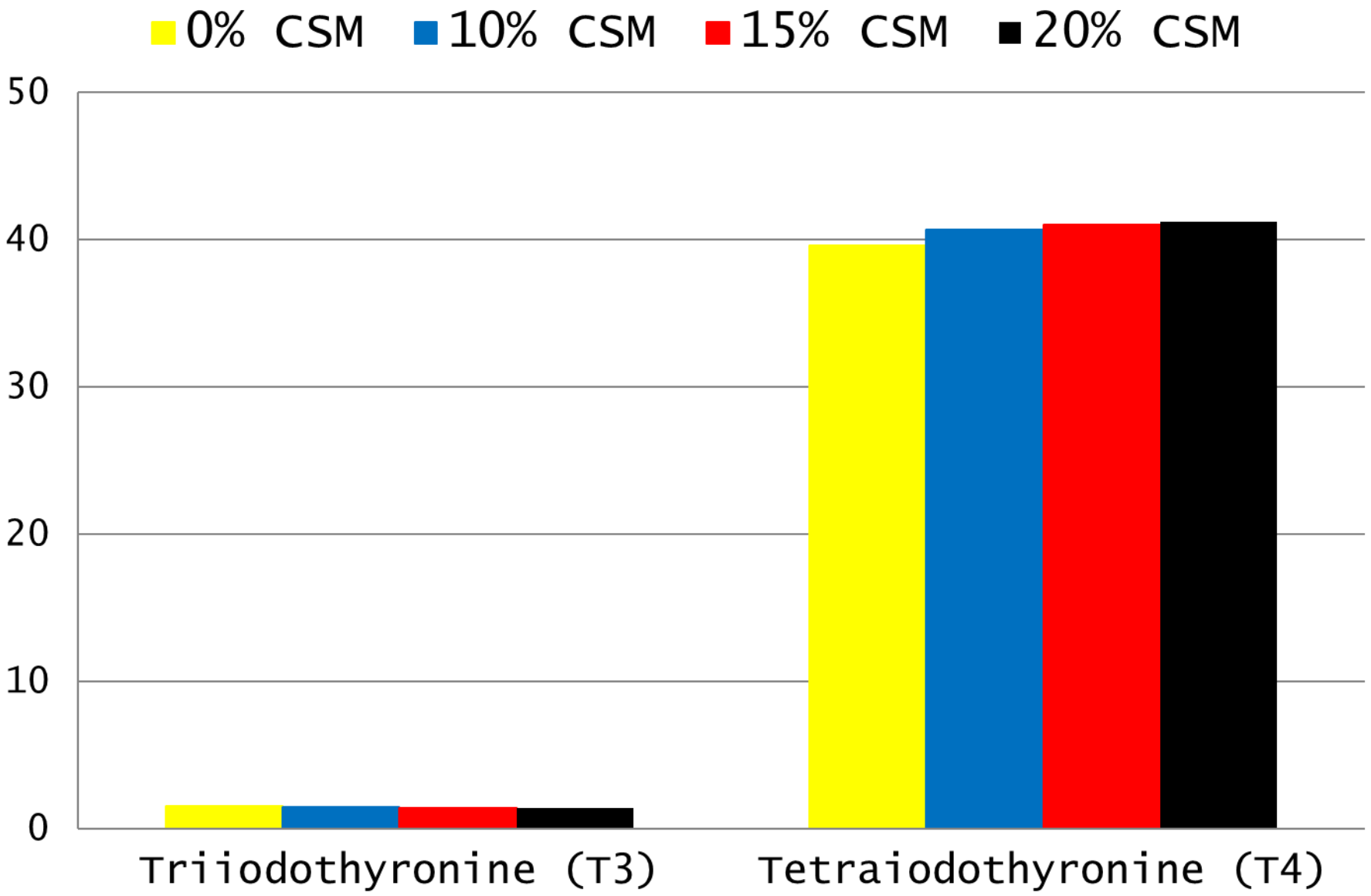

Conclusions

- CSM can be safely included in dairy cow diets up to 10% of dietary DM
  - No detrimental effects on production parameters and cow health
  - Improved milk fatty acid profiles
- Inclusion levels >10% detrimental
  - Reduced feed intake, milk production
  - Milk fat depression undesirable for economic reasons
- Depending on market price, CSM is a viable option as a substitute for canola meal when included up to 10% of dietary DM

Acknowledgments