Feeding oilseeds during late pregnancy in Holstein cows increased gestation length, dystocia, calf birth weight, and colostrum immunoglobulin content size

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Introduction

Long-chain polyunsaturated fatty acids

Linoleic acid (e.g. sunflower seed)

α-Linolenic acid (e.g. flax seed)

play important physiological roles during pregnancy such as:

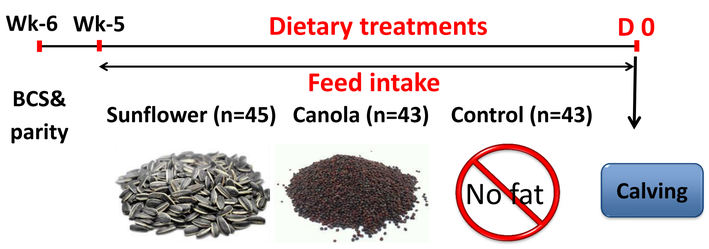
development of fetal brain and central nervous system

However, their effects on gestation length, the incidence of dystocia, calf weight and colostrum quality are poorly studied.

Objective

To determine if diets supplemented with sunflower or canola seed during late gestation will affect gestation length, calving ease, calf birth weight, and colostrum immunoglobulin content.

Methodology



Dam:

- BCS
- Calving ease
- Colostrum (n=13/trt):
  - IgG
  - Total fat
  - Protein
  - Fatty acid profile
- BW
- Gestation length

Calf:

- Calf Sex
- Body Weight

Results

Table 1: Effect of prepartum dietary treatment on dry matter intake

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
WK-4					
Primiparous	12.31±0.21	11.66±0.20	12.05±0.20	0.08	0.19
Polyparous	16.44±0.15	15.15±0.15	15.18±0.14	<.0001	0.88
WK-3					
Primiparous	12.35±0.22	11.52±0.21	12.89±0.21	0.58	<.0001
Polyparous	16.75±0.16	15.03±0.16	15.01±0.15	<.0001	0.92
WK-2					
Primiparous	12.03±0.21	11.76±0.20	12.08±0.20	0.66	0.27
Polyparous	15.72±0.15	14.21±0.15	14.03±0.14	<.0001	0.40
WK-1					
Primiparous	11.18±0.24	11.09±0.23	11.56±0.23	0.64	0.16
Polyparous	14.45±0.17	13.07±0.18	12.80±0.17	<.0001	0.28

Table 2: Effect of prepartum dietary treatment on body condition score and weight

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
BCS					
Day -35	3.33±0.06	3.31±0.04	3.36±0.04	0.23	0.46
Day 0	3.47±0.05	3.51±0.04	3.49±0.04	0.04	0.98
BW, kg					
Day -35	624.7±25.0	623.1±18.2	624.5±18.7	0.29	0.73
Day 0	605.6±27.9	613.7±22.9	617.8±22.8	0.33	0.77

Table 3: Effect of prepartum dietary treatment on gestation length and calf birth weight

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
Male/female ratio	0.45	0.50	0.57	-	-
Gestation length, d	272.86±0.88	275.42±0.87	276.62±0.88	0.008	0.32
Male	273.61±1.52	276.95±1.44	276.29±1.32	0.10	0.73
Female	273.40±1.00	274.41±0.95	277.39±1.05	0.04	0.04
Calf birth weight, kg	40.97±0.84	42.91±0.8	44.38±0.83	0.01	0.15
Male	43.68±1.27	44.69±1.12	45.13±1.09	0.41	0.78
Female	40.43±1.22	42.30±1.28	45.41±1.35	0.03	0.10

Table 4: Effect of prepartum dietary treatment on incidence of early postpartum health disorders

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
No. of cows (n)	43	43	45	-	-
Dystocia, n (%)	7(17)	8(18)	16(35)	0.08	0.03
Calf survival, n (%)	41(96)	38(89)	44(96)	0.59	0.19
Retained placenta, n (%)	2(4)	2(4)	4(8)	0.68	0.44
Subclinical endometritis, n (%)	16(37)	14(32)	15(32)	0.84	0.90
Metritis, n (%)	4(10)	9(21)	9(20)	0.09	0.91
Vaginal discharge, n (%)	4(10)	8(19)	8(18)	0.16	0.91
Ovarian cyst, n (%)	4(10)	6(14)	10(22)	0.19	0.31
Mastitis, n (%)	2(4)	0(0)	1(2)	0.12	0.24
Clinical Ketosis, n (%)	1(2)	0(0)	1(2)	0.35	0.24
Death, n (%)	1(2)	1(2)	2(4)	0.78	0.59
Total reproductive disorders, n (%)	10(23)	14(33)	22(50)	0.01	0.52
Total health disorders, n (%)	12(27)	14(32)	24(52)	0.11	0.06

Table 5: Effect of prepartum dietary treatment on colostrum composition

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
Mean IgG	21.15±0.92	20.28±0.96	24.28±0.88	0.29	0.002
Fat	5.45±0.46	4.04±0.48	3.73±0.44	0.11	0.97
Protein	12.65±0.66	12.90±0.69	15.03±0.63	0.09	0.05
Lactose	3.04±0.10	3.14±0.11	2.85±0.10	0.48	0.07

Table 6: Effect of prepartum dietary treatment on colostrum fatty acid profile

	Prepartum dietary treatment			P-values	
	CON	CAN	SUN	CON vs. FAT	CAN vs. SUN
C18:1 cis-9	15.69±0.75	20.95±0.75	17.65±0.75	0.0004	0.003
C18:2 n-6	2.50±0.12	2.73±0.12	3.41±0.12	0.0005	0.0003
ΣSFA	63.06±1.24	59.91±1.24	62.94±1.24	0.28	0.09
ΣMUFA cis	19.92±0.81	24.68±0.81	21.53±0.81	0.002	0.009
ΣMUFA trans	1.71±0.25	2.71±0.25	2.82±0.25	0.001	0.76
ΣPUFA	4.51±0.21	4.99±0.21	5.80±0.21	0.001	0.01
ΣPUFA: ΣSFA	0.07±0.00	0.08±0.00	0.09±0.00	0.001	0.10
Σn-3 PUFA	0.46±0.03	0.59±0.03	0.49±0.03	0.09	0.04
Σn-6 PUFA	3.65±0.17	3.91±0.17	4.67±0.17	0.004	0.003
Σn-6PUFA:Σn-3PUFA	8.12±0.55	6.69±0.55	10.06±0.55	0.70	0.0001

Take home message

Feeding rations supplemented with oilseeds during late gestation reduced DM intake, increased gestation length, female calf birth weight and the incidence of dystocia. Including rolled sunflower seed (high in linoleic acid) in the ration before calving improved colostrum quality.

Acknowledgements

Alberta Government
Agriculture & Rural Development
Livestock Research Branch

UNIVERSITY OF ALBERTA
DEPARTMENT OF AGRICULTURAL, FOOD & NUTRITIONAL SCIENCE

Dairy Research and Technology Centre
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