Effect of Diet and Stage of Gestation on Maternal Digestive Tract in Crossbred (Holstein-Gyr) Dairy Cattle

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The main site for nutrient absorption is the gastrointestinal tract; thus, changes in maternal visceral organs during gestation may affect both dam and fetus (Meyer *et al* 2010). Therefore, our objectives were to evaluate the influence of stage of gestation (SG) and feeding regime (FR) on maternal digestive tract mass in Holstein × Gyr cows. Forty four pregnant multiparous Holstein × Gyr cows from Embrapa Dairy Cattle, with average initial liveweight of 480 ± 10.1 kg and age 5 ± 0.5 were allocated to 1 of 2 FR: ad libitum (AL; n = 20) and maintenance level (ML; n = 24). Maintenance level was considered as 1.15% of liveweight. Cows were individually fed a corn silage-concentrate based diet (93% and 7% dry matter (DM) basis, respectively) as a total mixed ration, twice a daily. Pregnant cows were slaughtered at 4 SG: 139, 198, 241, and 268 d. Cows were slaughtered at Universidade Federal de Viçosa by stunning with a captive bolt and exsanguinated and after necropsied. Data were analyzed as a 4 × 2 factorial design using the MIXED procedure (SAS Inst. Inc., Cary, NC). There was no interaction ($P > 0.10$) between SG and FR to reticulum-rumen, omasum, abomasum, small and large intestines. Effect ($P < 0.10$) of FR was observed to abomasum, small and large intestines in relative weight. Stage of gestation influenced ($P < 0.10$) reticulum-rumen and, omasum and large intestine. Reticulum-rumen greater ($P < 0.01$) values were obtained at 139 d than 199, 241 and 268 d of gestation. Omasum and large intestine presented greater ($P < 0.01$) values at 139 d than 241 and 268 d of gestation. SG seems to influence reticulum-rumen mass and in relative weight (g/kg of Empty Body Weight - EBW). We observed a relation between reticulum-rumen and DMI (data not shown). From 200 d of gestation DMI (% BW) started decreasing in AL-fed cows (data not shown) and it coincides with the SG that reticulum-rumen also started decreasing. Thus, the lower rumen fill from 200 d of gestation may be related to the decrease of reticulum-rumen (kg of EBW). The decrease of omasum (g/kg of EBW) due SG observed in the present study may be related to the same behavior observed to reticulum-rumen. The greater values observed to small and large intestines (g/kg of EBW) to ML-fed cows in this study may be due the fact that the gastrointestinal tract serves as the main site for nutrient absorption. Reed *et al* (2007) suggested that dam may compensate for nutritional deficiency, thus sparing her offspring. In this way, dairy cattle gastrointestinal tissues seem to be responsive to nutrient restriction. In addition, large intestine (g/kg of EBW) may be responsive to SG since it decreased at 241 and 268 d compared to 139 d of gestation.

Table 1. Main effect means ± SE of gastrointestinal tract in Holstein × Gyr cows fed ad libitum or maintenance level in different day of gestation

Item	Feeding regime		Stage of gestation (SG)(d)				*P*-value		
(g/kg of EBW)	*Ad libitum*	Maintenance	139	199	241	268	FR	SG	FR × SG
Reticulum-rumen	17.4 ± 0.45	17.8 ± 0.41	20.5^{a} ± 0.66	18.0^{b} ± 0.59	16.4^{b} ± 0.59	15.9^{b} ± 0.59	0.71	<0.001	0.37
Omasum	6.72 ± 0.26	6.47 ± 0.23	7.34^{a} ± 0.38	6.74^{ab} ± 0.35	5.83^{b} ± 0.35	6.26^{b} ± 0.35	0.38	<0.01	0.36
Abomasum	2.62 ± 0.09	2.98 ± 0.08	2.99 ± 0.13	2.81 ± 0.12	2.70 ± 0.12	2.62 ± 0.12	<0.01	0.26	0.19
Small intestine	9.41 ± 0.34	10.5 ± 0.31	10.5 ± 0.49	10.8 ± 0.45	9.86 ± 0.45	9.65 ± 0.45	0.03	0.15	0.32
Large intestine	5.78 ± 0.30	6.56 ± 0.27	7.18^{a} ± 0.42	6.05^{ab} ± 0.39	5.79^{b} ± 0.39	5.54^{b} ± 0.39	0.07	0.03	0.75

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