Relationship between nutritional and metabolic profiles and pregnancy status after first AI in lactating dairy cows

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BACKGROUND & OBJECTIVE

• During the first two weeks after calving, high producing dairy cattle are susceptible to an increased incidence of metabolic disorders that might affect reproductive performance in early lactation.

The objective of this study was to examine the relationship between plasma nutritional and metabolic profiles and pregnancy status (conception rate and pregnancy loss after first AI) in lactating dairy cows.

MATERIALS & METHODS

• 870 lactating dairy cows from 11 freestall dairy herds located in Alberta, Canada.

• Blood samples were collected between 2 and 14 dpp (days postpartum).

• Plasma concentrations of minerals (Ca, P, Mg, K, and Na), total protein (TP), albumin (Ab), globulin (Gl), urea (Ur), glucose (Glu), liver enzymes [ɣglutamyl transpeptidase (GGT), aspartate aminotransferase (AST), glutamate dehydrogenase (GLDH)], β-hydroxybutyrate (BHBA), non-esterified fatty acids (NEFA), haptoglobin (Hp), and cholesterol (Cho) were measured with an automated analyzer (Hitachi 911 Analyzer, Laval, QC).

• Conception rate and pregnancy loss after first AI data were retrieved from DairyComp305.

• Data were analyzed using MIXED and LOGISTIC procedures in SAS.

RESULTS

• Overall, 37.9% (330/870) of cows became pregnant following first AI (73.3 ± 0.7 dpp), while 9.1% (30/330) lost the pregnancy by 60 after AI.

• Plasma minerals, TP, Ab, Gl, Ur, Glu, GGT, GLDH and BHBA concentrations were not associated with pregnancy outcome after first AI.

Table 1. Plasma concentration of variables associated with conception rate after first AI.

	Pregnancy outcome after first AI		
Variable	Non-pregnant (n=540)	Pregnant (n=330)	P-value
AST (U/L)	92.1 ± 1.6	84.8 ± 2.0	0.01
NEFA (mmol/L)	0.65 ± 0.02	0.56 ± 0.02	0.01
Hp (g/L)	0.77 ± 0.04	0.60 ± 0.05	0.05
Cho (mmol/L)	2.1 ± 0.03	2.4 ± 0.04	0.05

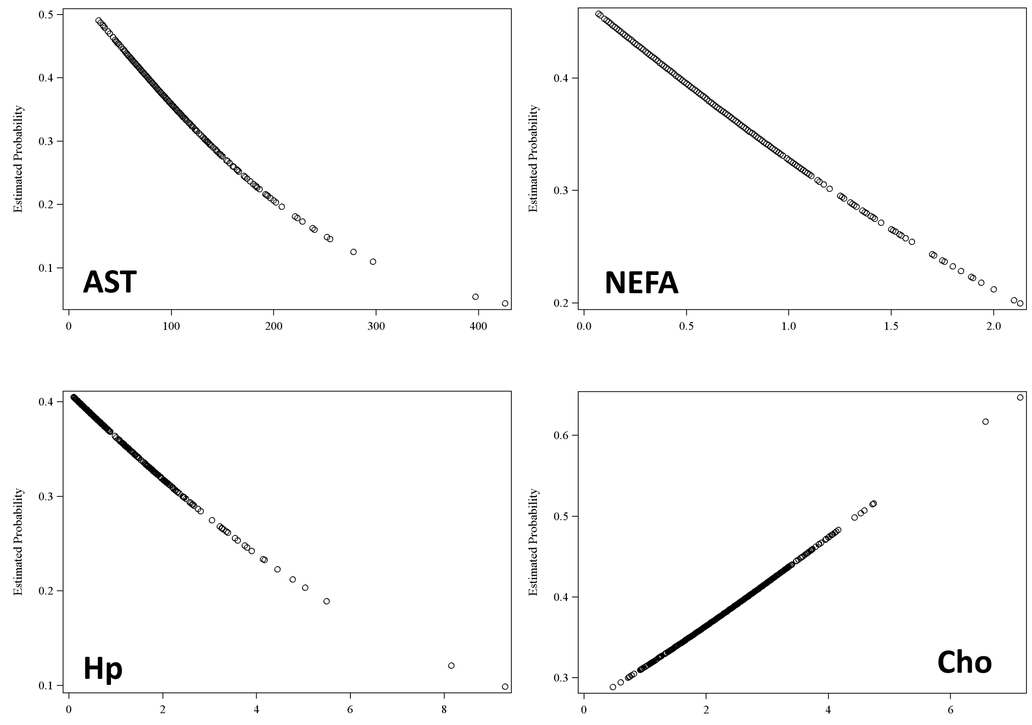

Fig 1. Relationship between plasma concentrations of AST, NEFA, Hp and Cho during early postpartum and predicted probability of pregnancy after first AI.

Table 2. Plasma concentration of haptoglobin (Hp) in lactating dairy cows with different pregnancy loss outcome after first AI.

	Pregnancy loss after first AI		
Variable	YES (n=30)	NOT (n=300)	P-value
Hp (g/L)	1.1 ± 0.09	0.50 ± 0.05	0.01

SUMMARY

• High plasma concentrations of AST, NEFA and Hp were associated with reduced fertility after first AI.

• Low plasma concentrations of Cho were associated with reduced fertility after first AI.

• High plasma concentrations of Hp were associated with increased pregnancy loss.

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