Selected Biochemical Parameters for Estimation of Energy Metabolism in Dual Purpose Cows

Jan Bouda
Eugenia Candanosa-de Morales
Gerardo F. Quiroz-Rocha
Leopoldo Paasch-Martínez
Department of Clinical Diagnosis
Faculty of Veterinary Medicine
National Autonomous University of Mexico
Mexico City

Milk production based on grazing conditions in Mexico is very important, especially in tropical regions. Since quantity and quality of pasture offered fills the main necessities, cows frequently suffer from energy imbalance, mainly during the dry season. It is important to measure selected biochemical parameters in the body fluids to estimate the energy status and relate it with metabolic disorders, milk production and infertility. In 10 cows (F1 Holstein x Cebu) on grazing conditions with mineral and molasses supplementation, samplings were done during the following periods: 2-3 weeks prepartum, 3 weeks, 2, 3, 4 and 7 months postpartum. In each period physical examinations of animals, milk yield and body condition were registered. Ruminal fluid was collected by ruminal tube and double way pump for these analyses: pH (by portable pH-meter), oxide-reduction bacterial activity and volatile fatty acids. Blood was taken from jugular vein into heparinized tubes, and in the plasma were measured levels of urea and glucose. Urine samples were obtained by catheterization of urine bladder for determination of specific gravity, pH, proteins by sulphosalicylic acid, bilirubin, blood and ketone bodies. Fat content was also measured in milk. Results are summarized in Tables 1 and 2. In the period 2-3 weeks prepartum, in 20% of cows it was detected a mild increase in ruminal pH, the decrease in oxide-reduction bacterial activity, decrease in urine pH, which corresponded to simple indigestion. These alterations were caused by a reduced grass mass and quality and following reduced intake. Measurements at 3 weeks, 2, 3 and 7 months postpartum in urine and ruminal fluid revealed ketonuria in 30 to 60 % of cows related to decreased body condition and subclinical ruminal acidosis. Decreased levels of blood plasma urea were found in 20 - 60% of cows at samplings after parturition, especially 2 and 3 months postpartum. Low milk fat levels were caused by *ad libitum* access to molasses. On the base of those results it was recommended to optimize feeding ration, molasses and mineral supplementation according to milk yield and parturition schedule with respect to quality and sufficient quantity of pasture.

Table 1. Ruminal fluid values in dual purpose cows.

		a	b	c	d	e	f
pH	X	6.75	6.52	6.41	6.6	5.8	6.19
	sd	0.26	0.35	0.49	0.40	0.14	0.18
decreased	%	0	10	10	10	70	30
increased	%	20	0	0	10	0	10
Oxide-reductive bacterial	X	9	6.68	6.05	4	3.5	5.3
activity (min)	sd	0.8	3.53	0.7	1.41	1.5	1.41
prolonged	%	63.63	60	0	0	0	10
Total volatile	X		6.44	6.33	5.66	6.83	5.95
fatty acids (mg/ml)	sd		0.82	0.89	1.38	0.63	1.15
Acetic acid (%)	X		70.51	67.59	68.90	67.71	67.40
	sd		2.75	3.84	2.48	2.48	5.44
propionic acid (%)	X		15.82	16.21	15.43	16.61	16.85
	sd		1.03	2.14	0.82	1.03	1.98
Butyric acid (%)	X		13.70	16.18	15.65	15.66	15.74
	sd		2.02	4.72	1.98	2.44	4.07

a.- 2-3 weeks prepartum
b.- 3 weeks postpartum
c.- 2 months postpartum
X.- mean
d.- 3 months postpartum
e.- 4 months postpartum
f.- 7 months postpartum
sd.- standard deviation

Table 2. Urine, blood plasma and milk values in dual purpose cows.

		a	b	c	d	e	f
Urinary pH	X	7.74	8.07	8.1	8.07	8.08	7.57
	sd	0.40	0.34	0.12	0.31	0.17	0.18
decreased	%	30	10	0	10	0	20
Increased ketone bodies in urine	%	0	50	60	50	60	30
Blood plasma urea	X	30.16	24.5	14.7	30.74	16.3	16.42
(mg/dl)	sd	7.99	9.47	8.32	3.81	4.42	6.43
increased	%	0	10	0	10	0	0
decreased	%	0	40	60	20	60	60
milk fat (%)	X		2.95	2.65	2.15	2.60	2.84

a.- 2-3 weeks prepartum
b.- 3 weeks postpartum
c.- 2 months postpartum
X.- mean
d.- 3 months postpartum
e.- 4 months postpartum
f.- 7 months postpartum
sd.- standard deviation

References

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