BOVINE EMBRYOS CAN USE KETONE BODIES AS ENERGY SUBSTRATES AT DIFFERENT DEVELOPMENTAL STAGES IN VITRO.

E. Gómez and C. Díez

Consejería de Agricultura. CIATA. CENSYRA. Aptdo 155. Somió s/n. Gijón. Asturias. SPAIN

In vitro produced (IVP) bovine embryos can develop in presence of the ketone bodies (KB) acetoacetate and β-D-hydroxybutyrate. The lipid store in embryonic cells suggest that KB presumably play a role during embryo development. The effects of KB, added on different periods of the early bovine embryo development, were examined.

Bovine cumulus-oocyte complexes (COCs) from slaughtered Asturiana de los Valles cow ovaries were incubated for 24 h in TCM-199, FSH, LH, E_2 and FCS in 5% CO_2 in air and high humidity throughout. Matured COCs were fertilized with swim-up separated frozen-thawed sperm for 18±1 h. Presumptive zygotes were vortexed for 3 min and cultured in mSOF suplemented either with lactate/pyruvate 3.3 mM/0.3 mM, as usual, or with a single KB 3.6 mM at 3 periods: 0 to 48 h, 48 to 120 h and 120 to 216 h. Results of embryo development are shown in table 1. Data were analyzed by ANOVA and Tukey's test, and expressed as means±SEM.

TABLE 1: Development up to the hatched blastocyst stage of bovine IVP embryos cultured in mSOF with acetoacetate or β-D-hydroxybutyrate replacing lactate and pyruvate during 3 different periods of culture.

Culture period/ Treatment	Embryos	% Blastocysts Day 8 (168 h)	%Expanded blastocysts	%Hatched Blastocysts
0-48 h /	Zigotes			
Acetoacetate	106	36.84±9.01	34.94±7.94	24.54±9.79
Hydroxybutyrate	111	27.13±2.86	19.26±3.11	13.82±2.91
Lactate/Pyruvate	108	37.63±0.79	34.51±2.45	27.28±4.48
48-120 h /	8-16 cell			
Acetoacetate	89	60.02±11.73	48.46±7.66	19.74±1.23
Hydroxybutyrate	90	52.84±4.67	32.96±6.79	15.82±6.22
Lactate/Pyruvate	90	46.47±7.12	34.22±5.51	18.38±5.31
120-216 h /	M + EB			
Acetoacetate	58	74.75±6.46	56.46±16.37	21.89±9.76
Hydroxybutyrate	56	51.10±12.71	49.34±13.77	15.16±10.06[a]
Lactate/Pyruvate	56	64.31±8.57	53.64±5.78	27.40±6.88[b]

Period 0-48 h: 3 replicates; period 48-120 h: 4 replicates; period 120-216 h: 3 replicates. M+EB= morulae + early blastocysts .Values with different superscripts within each column and culture period differ ($P<0.05$)

Results demonstrate that acetoacetate and hydroxybutyrate can be used as energy substrates at different periods along the early bovine embryo development in vitro. This means that embryos are enabled to make a metabolic use of a eventual lipid breakdown.