Tools to assess Iodine deficiency in calves born from deficient and non-deficient dams

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INTRODUCTION

Iodine deficiency occurs with a high frequency in Europe, as much in humans as in cattle. Pathologies related to this deficiency are common and largely concern newborns. Nowadays, numerous mineral factories increase I content in their mineral-vitamin premix to prevent I deficiency. But the diagnosis of I deficiency must be previously made. The aim of this study is to compare biochemical tools to assess I deficiency in the newborn calf.

MATERIAL & METHODS

➢ **Animals & groups**

⇨12 healthy pregnant Holstein cows (>3 y) in 2 groups of 6 : **NS** (non-supplemented with I) and **S** (suppl. with I at least 2 months before calving)

⇨ All cows deficient at the beginning (based on Plasmatic Inorganic Iodine -PII- <40 µg/L)

➢ **Nutrition**

⇨ Diet composition (10 kg DM) : hay, concentrate 18% protein, flat barley, dried beet pulp → 5 mg I + 1 mg Se/cow/day

⇨ Iodine supplement : iodinized salt containing I (Ca-iodate) and Se (Na-selenite) → 50 mg I + 3 mg Se/cow/day

➢ **Samples & Dosages, at birth before colostrum and 15 days later for calves and at calving for dams**

⇨ Plasma (heparin) and Serum : dams & calves → PII, bTSH, total-T4, total-T3 and r-T3

⇨ Colostrum, Milk, Amniotic and Allantoic fluids : dams → Iodine

Dam : No mineral

Calf : colostrum & milkreplacer

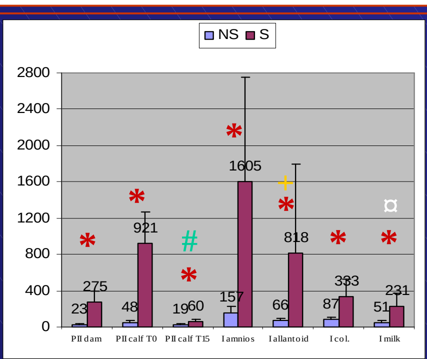
NS

S

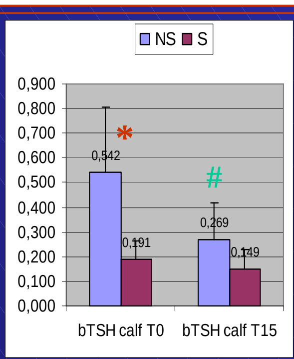
Dam : + Mineral 50 mg I + 3 mg Se/day

Calf : colostrum & milkreplacer

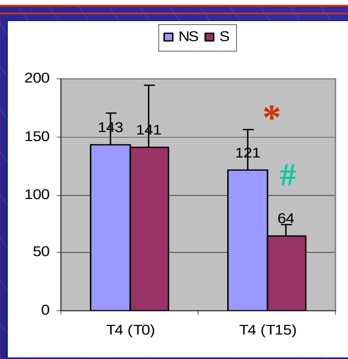
RESULTS

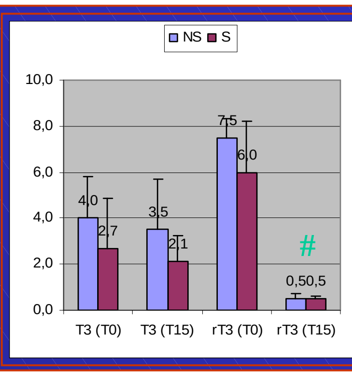


I in calves & dams (µg/L)



bTSH calf (ng/ml)





T4, T3, rT3 (nmol/L) at birth (T0) & T15 in calves

Legend (Statistics)

Statistic tests : *t*-student test, paired and unpaired

(*) Comparison NS >< S, significantly different (p<0.05)

(#) Comparison T0 >< T15, significantly different (p<0.05)

(+) Comparison amnios >< allantoid : significantly different (p<0.05)

(¤) Comparison colostrum >< milk : significantly different (p<0.05)

Correlation	R^2	r
PII calf-dam	0.53	0.73
PII calf - I amnios	0.81	0.90
PII calf - I allantoid	0.62	0.79
bTSH calf-dam at calving	0.44	0.66
T4 calf-dam	0.39	0.62
T3 calf-dam	0.06	0.24

DISCUSSION

Iodine supplementation increased PII in both dams and calves. I content of colostrum, milk, allantoic and amniotic fluids is affected in the same way by the supplementation. Iodine levels in the different physiological fluids reflect therefore recent I supplies. Calves PII was more correlated with I in fetal fluids than PII in the dam. This might indicate the placental transfer of I from dam to calf. If I levels could clearly discriminate the groups, thyroid hormones T4 (at T0), T3 and r-T3 didn't show any difference between groups. Nevertheless, 0.5 ppm I (diet) is just sufficient for the synthesis of thyroid hormones. However, bTSH discriminated the 2 groups of newborn calves. Further studies are needed to fix normal values of bTSH in dams and calves.

Recommended literature

Hemingway et al. Vet. J., 2001, 162: 158-160

Miller et al. J. Dairy Sci., 1975, 58: 1578-1593

Huszenicza et al. Vet.Med.-Czech, 2002, 47: 199-210

Smyth et al.. Vet. Rec., 1996, 139: 11-16

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