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†

611130

214151

404155

Bos taurus

45 kg 20 3 54 A 40 kg 9 B 40 ~ 45 kg 25 C

ELISA

Pearson

1

$P < 0.01$

0.05 2

$P > 0.05$

$P < 0.01$ 3

$P > 0.05$

0.05 4

$P < 0.05$

$P > 0.05$

5

0.05

$P < 0.01$

$P >$

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Correlation of Leptin and Insulin in Venous Serum with Calf Birth Weight

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Abstract: This study aimed to explore the correlation between the calf birth weight and leptin or insulin level in venous serum of the puerperal cow, calves or cords. We chose 54 healthy Holstein cows that experienced normal natural birth, divided them into group A (calf birth weight 40 kg, $n = 9$), group B (calf birth weight $40\text{--}45\text{ kg}$, $n = 25$) and group C (calf birth weight 45 kg , $n = 20$), and collected the venous serum samples from the puerperal cow, the calf and the umbilical cord, respectively. The expression levels of serum leptin and insulin were detected by ELISA. Single factor analysis of variance and bivariate Pearson were used to analyze the correlation of the expression levels of leptin and insulin in these three kinds of venous sera, as well as their correlation with the calf birth weight. The results demonstrated that: (1) Leptin and insulin in venous serum of puerperal cows were significantly higher than in calves and cords ($P < 0.01$), while leptin and insulin in venous serum of puerperal cows had no significant correlation with that of calves or cords ($P > 0.05$) (Table 1). (2) There was no significant difference in the expression level between leptin and insulin in venous serum of calves and that of cords ($P > 0.05$), while leptin and insulin in venous serum of calves had highly significant positive correlation with that of cords ($P < 0.01$) (Table 2). (3) There was significant positive correlation between leptin and insulin in venous serum from both puerperal cows and cords ($P < 0.05$), but there was no significant correlation in calves ($P > 0.05$) (Table 3). (4) The calf birth weight had no significant correlation with leptin and insulin in venous serum of puerperal cows ($P > 0.05$); however, it had significant positive correlation with leptin in venous serum ($P < 0.05$) and highly significant positive correlation with insulin in venous serum ($P < 0.01$) from calves and cords (Table 4). (5) There was no significant difference in Leptin and insulin levels in venous serum from puerperal cows, calves or cords between male and female calves ($P > 0.05$) (Table 5). In conclusion, leptin and insulin expression levels in puerperal cows were significantly higher than those of calves and cords. The calf birth weight had no significant correlation with leptin and insulin in venous serum of puerperal cows, while it had significant positive correlation with leptin and insulin in venous serum from both calves and cords.

Key words: Leptin; Insulin; Cord venous blood; Cow; Calf birth weight

| | | | | | |
|--|---------------------|-------------|-------------------|-------------------------|-------------------|
| | <i>Bos taurus</i> | | omentin | | TNF- |
| | adipokines | | | <i>Homo sapiens</i> | <i>Sus scrofa</i> |
| | Herrera et al. 2014 | | <i>domesticus</i> | <i>Canis familiaris</i> | <i>Mus</i> |
| | | | <i>musculus</i> | | |
| | leptin | adiponectin | | Ashworth et al. 2000 | Wauters |
| | resistin | visfatin | et al. 2000 | Smolinska et al. 2007 | Balogh et al. |

| | | | | | | | |
|---------------------|-------------|------------|--------------|------------|------------|------------|--------------|
| 2015 | | | | | | R | 0.990 0 |
| Perlitz et al. 2009 | | 2014 | Walsh et al. | | | | |
| 2014 | Tsai et al. | 2015 | | | | | |
| | | | | 1.4 | | | |
| | | | | SPSS15.0 | | | K-S |
| | | | | | | | ± |
| | | | | Mean ±SE | | | |
| | | | | <i>t</i> | | | |
| | | | | | | Pearson | |
| | | | | | | $P < 0.05$ | $P < 0.01$ |
| | | | | 2 | | | |
| 1 | | | | 2.1 | | | |
| 1.1 | | | | A B C | | | |
| | 500 kg | 2 ~ 4 | | | | | |
| 95 | | | | | | | $P >$ |
| | | | | | | | A |
| | | 54 | | 0.05 | | | B |
| 1.2 | | | | | C | $P < 0.05$ | A B B |
| | | | | | C | | $P > 0.05$ |
| | ELISA | | | | | | |
| | | 2 0 7 " | i ENk800 | | A | B | C $P < 0.01$ |
| | BIO-TEK | | | | B | C | $P > 0.05$ |
| 1.3 | | | | | | | A B C |
| 1.3.1 | | | 10 ml | | | | A |
| | | | | | | C | $P < 0.05$ |
| 10 ml | | | | | B | B | C $P >$ |
| 1 h | 352 g | 10 min | | 0.05 | 1 | | |
| EP | 20 | | | | | | |
| 1.3.2 | | | | | | | $P < 0.01$ |
| XK3190-A12+E | | 0.1 kg | | $P > 0.05$ | 2 | | |
| | | 40 kg | | | | | $P <$ |
| A 9 | | 40 ~ 45 kg | | 0.05 | | | |
| B 25 | | 45 kg | | | $P > 0.05$ | 3 | |
| C 20 | | | | 2.2 | | | |
| 1.3.3 | ELISA | | | | | | |
| | ELISA | | | | | | |
| 3 | | | | | | $P > 0.05$ | |

1

Table 1 The levels of leptin and insulin in venous blood from cows, calves or cords

| | | Group | | |
|---------------------------------------|------|---------------------------|----------------------------|---------------------------|
| | | A n = 9 | B n = 25 | C n = 20 |
| Birth weight (kg) | | 36.68 ± 2.12 | 42.42 ± 1.58 | 48.56 ± 3.59 |
| The levels of leptin in venous blood | Cow | 21.07 ± 1.71 | 20.40 ± 2.48 | 21.44 ± 3.05 |
| | Calf | 11.71 ± 1.10 ^a | 12.59 ± 0.97 ^{ab} | 12.72 ± 0.96 ^b |
| | Cord | 12.09 ± 0.95 ^a | 12.58 ± 0.93 ^{ab} | 14.36 ± 1.16 ^b |
| The levels of insulin in venous blood | Cow | 38.35 ± 3.92 ^a | 34.32 ± 5.05 ^b | 34.13 ± 4.91 ^b |
| | Calf | 23.02 ± 0.87 ^a | 23.35 ± 1.07 ^{ab} | 23.88 ± 1.19 ^b |
| | Cord | 22.63 ± 1.15 ^a | 23.27 ± 1.27 ^{ab} | 24.42 ± 1.16 ^b |

P < 0.05

Different superscripts in the same row indicate significant difference. The different lowercase letters indicate *P*-value lower than 0.05.

2

Table 2 The levels of leptin and insulin in venous blood from cows, calves and cords

| | Sample size | Leptin * i 1 N | Insulin (mU/L) |
|-------------------|-------------|---------------------------|---------------------------|
| Cow venous blood | 54 | 20.90 ± 2.61 ^A | 34.92 ± 4.99 ^A |
| Calf venous blood | 54 | 12.49 ± 0.98 ^B | 23.49 ± 1.21 ^B |
| Cord venous blood | 54 | 12.61 ± 0.85 ^B | 23.59 ± 1.37 ^B |

P < 0.01

Different superscripts in the same column indicate significant difference. The different uppercase letters indicate *P*-value lower than 0.01.

3

Table 3 Correlation between the leptin and insulin levels in venous blood from cows, calves and cords

| | Cow venous blood | Calf venous blood | Cord venous blood |
|-------------------------|------------------|-------------------|-------------------|
| <i>r</i> <i>r</i> value | 0.280 | 0.266 | 0.280 |
| <i>P</i> <i>P</i> value | 0.040 | 0.052 | 0.041 |

P < 0.05

P > 0.05

5

P < 0.01

3

3.1

P > 0.05

P <

0.01

4

2.3

2006

P < 0.01

Perlirz

2009

4

Table 4 Correlation between the levels of leptin and insulin in venous blood from cows, calves and cords and the calf birth weight

| | | E q y ø u " x g p q | | E c n x g u ø " x g | | Cord venous blood | |
|----------------------------------------------|--------------|---------------------|----------------|---------------------|----------------|-------------------|----------------|
| | | <i>r</i> | <i>P</i> | <i>r</i> | <i>P</i> | <i>r</i> | <i>P</i> |
| | | <i>r</i> value | <i>P</i> value | <i>r</i> value | <i>P</i> value | <i>r</i> value | <i>P</i> value |
| The levels of leptin in venous blood * i l | Birth weight | 0.245 | 0.074 | 0.297* | 0.029 | 0.282* | 0.039 |
| | Cow | | | 0.097 | 0.487 | 0.143 | 0.301 |
| | Calf | | | | | 0.837** | < 0.001 |
| | Cord | | | | | | |
| The levels of insulin in venous blood (mU/L) | Birth weight | 0.223 | 0.105 | 0.358** | 0.008 | 0.542** | < 0.001 |
| | Cow | | | 0.165 | 0.234 | 0.215 | 0.118 |
| | Calf | | | | | 0.630** | < 0.001 |
| | Cord | | | | | | |

r. † $P < 0.05$ †† $P < 0.01$

Means with †† indicate *P*-value lower than 0.01, and means with † indicate *P*-value more than 0.05.

5

Table 5 The levels of leptin and insulin in venous blood from cows, calves and cords in male and female calves

| | | Group | |
|----------------------------------------------|-------------------|---------------------------|---------------------------|
| | | Male <i>n</i> = 22 | Female <i>n</i> = 32 |
| | Birth weight (kg) | 46.09 ± 5.30 ^A | 42.18 ± 4.02 ^B |
| The levels of leptin in venous blood * i l N | Cow | 29.11 ± 4.69 | 29.17 ± 3.58 |
| | Calf | 12.37 ± 0.77 | 12.58 ± 1.08 |
| | Cord | 12.42 ± 0.77 | 12.73 ± 0.90 |
| | | | |
| The levels of insulin in venous blood (mU/L) | Cow | 34.68 ± 5.56 | 35.08 ± 4.65 |
| | Calf | 23.87 ± 1.21 | 23.23 ± 0.98 |
| | Cord | 24.14 ± 1.20 | 23.21 ± 1.37 |

$P < 0.01$ Different uppercase letters indicate *P*-value lower than 0.01.

2003

2008

2006 Ingavrtsen

2001

JAK/STAT

2003

Lepercq et al. 2001

Ogueh 2000

2008

Kirwin 2006

Yonekure 2013

2001

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- 1
- , 33(2): 150-151.
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- , 19(4): 233-235.
- 2014.
- IGF-
- , 31(1): 7-9.
- 2009.
- , 27(6): 556-559.
- 2014.
- , 22(12): 85-89.
- 2012.
- 1
- , 39(16): 10-11.