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1

The relationship between fat and progesterone, estradiol, and chorionic gonadotropin levels in Quebec cow's milk

A R Gilman [1], W Buckett [2], W Y Son [2], J Lefebvre [2], A M Mahfoudh [2], M H Dahan [2]

Affiliations
PMID: 28840413   PMCID: PMC5699997   DOI: 10.1007/s10815-017-1025-0
Free PMC article

Abstract

Purpose: The majority of milk in industrialized countries is obtained from pregnant cows, which contains increased levels of estrogen and progesterone compared to non-pregnant cows. The aim of this study was to quantify the amount of hormones present in milk with different fat content because previous studies on humans have shown potential effects of increased milk consumption on serum and urine hormone levels as well as on sperm parameters. However, it is unclear whether consumption of milk at the currently recommended levels would lead to systemic effects.

Methods: Samples of cow's milk of varying fat concentrations (0, 1, 2, 3.25, 10, and 35%) were analyzed via competitive ELISA assays.

Results: Progesterone concentrations were significantly correlated to increasing fat content of milk (r = 0.8251, p = 0.04).

Conclusions: Research on conditions in which additional progesterone may have an effect on human health should consider inclusion of limitation of milk intake and its effects. Further studies are needed to determine the concentration of progesterone in milk of different fat content in other regions and countries and to quantify the potential pathophysiologic role.

Keywords: Cow milk; Milk consumption; Progesterone; Sex hormones.

> 1 figure

2

Amount of Progesterone Consumed Based on Varying Fat Concentrations, Dietary Recommendations, and Estimated Safe Levels in Commercial Cow Origin Liquid Dairy Products

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PMID: 31199703   DOI: 10.1089/jmf.2019.0018

Abstract

Federal guidelines recommend that food with hormone content fall below 1% of endogenous production in the subset of the population with the lowest daily production. The majority of dairy products are obtained from pregnant cows, which increase the level of hormones present. The

purpose of this article was to perform theoretical evaluation of the quantity of progesterone in cow's milk based on fat percentages and to assess whether this was within the recommended range. Daily recommended dairy product intake from various countries worldwide was researched. This was compared to the concentration of progesterone previously identified in varying fat contents of cow origin milk to assess the amount of progesterone (mg/day) that would be consumed if the guidelines were followed. The maximum daily progesterone consumption suggested will be met by ingestion of 2.7 L, 1.42 L, 1.13 L, 940 mL, 810 mL, 650 mL of 0% (skim), 1%, 2%, 3.25%, 10% (cream), and 35% (whipping cream) fat liquid cow origin dairy product, respectively. Therefore, ingestion of the highest amount of recommended daily dairy intake fell below 1% of the daily endogenous quantity produced, except in the unlikely case of consumption of 650 mL of 35% fat. Studies demonstrating an effect of cow's liquid dairy product intake may need to be revisited, since levels of progesterone consumption remain within the recommended levels. However, it should be considered that ingestion of cow's milk might have a potential effect on the hormonal profile in patients; however, this seems unlikely.

Keywords: cow milk; dietary recommendations; progesterone.

3

Exposure to exogenous estrogen through intake of commercial milk produced from pregnant cows

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Affiliations
PMID: 19496976   DOI: 10.1111/j.1442-200X.2009.02890.x

Abstract

Background: Modern genetically improved dairy cows continue to lactate throughout almost the entire pregnancy. Therefore, recent commercial cow's milk contains large amounts of estrogens and progesterone. With regard to the exposure of prepubertal children to exogenous estrogens, the authors are particularly concerned about commercial milk produced from pregnant cows. The purpose of the present study was therefore to examine concentrations of serum and urine sex hormones after the intake of cow milk.

Methods: Subjects were seven men, six prepubertal children, and five women. The men and children drank 600 mL/m(2) of cow milk. Urine samples were collected 1 h before the milk intake and four times every hour after intake. In men the serum samples were obtained before and 15, 30, 45, 60, 90 and 120 min after milk intake. Women drank 500 mL of cow's milk every night for 21 days beginning on the first day of the second menstruation. In three successive menstrual cycles, the day of ovulation was examined using an ovulation checker.

Results: After the intake of cow milk, serum estrone (E1) and progesterone concentrations significantly increased, and serum luteinizing hormone, follicle-stimulating hormone and testosterone significantly decreased in men. Urine concentrations of E1, estradiol, estriol and pregnanediol significantly increased in all adults and children. In four out of five women, ovulation occurred during the milk intake, and the timing of ovulation was similar among the three menstrual cycles.

Conclusions: The present data on men and children indicate that estrogens in milk were absorbed, and gonadotropin secretion was suppressed, followed by a decrease in testosterone secretion. Sexual maturation of prepubertal children could be affected by the ordinary intake of cow milk.

> Cited by 16 articles

4

Comparison of the effects of gonadotropin-releasing hormone, human chorionic gonadotropin or progesterone on pregnancy per artificial insemination in repeat-breeder dairy cows

B Khoramian [1], N Farzaneh, M Talebkhan Garoussi, M Mohri

Abstract

Three different treatments were compared to improve pregnancy per artificial insemination (P/AI) in repeat-breeder (RB) dairy cows. All cows (n=103) were assigned to one of four groups: (1) gonadotropin-releasing hormone (GnRH); (2) human chorionic gonadotropin (hCG); (3) once-used controlled internal drug release (CIDR) device; and (4) control. All treatments performed 5-6days after artificial insemination (AI) and milk samples were collected just before treatment for progesterone assays. There were no significant differences in milk fat progesterone concentration among trial groups. Cows were observed for estrus signs thrice daily. Pregnancy per AI on day 45 in hCG and CIDR groups were significantly higher than GnRH and control groups (60.0% and 56.0% vs. 26.9% and 29.6%, respectively), but there were no differences in P/AI between GnRH and control groups. There were also no significant differences between hCG and CIDR groups. Milk fat progesterone concentrations were compared between pregnant and non-pregnant cows in each group and only in the hCG group it was significantly lower in pregnant cows. In conclusion, treating repeat-breeder cows with hCG or once-used CIDR 5-6days after AI improved P/AI.

Cited by 3 articles

5

[The measurement of estrogen and progesterone in commercial and traditional cow milk]

[Article in Chinese]

Hong Zhou [1], Li-Qiang Qin, Yan Wang, Pei-Yu Wang

Affiliations
PMID: 19950719

Abstract

Objective: To detect the content of estrogen and progesterone in commercial milk in China and to compare the differences between commercial cows and traditional cows in the content of estrogen and progesterone of the milk, the breeding of cows and the process of milk production.

Methods: Enzyme-linked immunosorbent assay (ELISA) was used to investigate the estrone, estradiol and progesterone in commercial and traditional milk, and literature review and field investigation was used to compare the differences of breeding and milk production.

Results: The mean concentration of estrone, estradiol and progesterone in Mongolian traditional cow milk was (98.5 +/- 12.4) pg/ml, (24.6 +/- 3.0) pg/ml and (0.2 +/- 0.3) ng/ml, respectively. The concentrations of estrone were (150.2 +/- 8.4), (131.3 +/- 16.3) and (128.9 +/- 13.0) pg/ml; The concentrations of estradiol were (35.4 +/- 2.2), (30.3 +/- 3.1) and (30.0 +/- 2.0) pg/ml; The concentrations of progesterone were (20.2 +/- 1.5), (18.1 +/- 2.2) and (16.5 +/- 2.4) ng/ ml, respectively. The content of estrogen and progesterone in commercial milks were higher than that in traditional milks (estrone comparison: t = 5.43, 19.23, 5.89; estradiol comparison: t = 4.14, 4.93, 14.03; progesterone comparison: t = 28.47, 32.73, 22.82; P < 0.05). Mongolian traditional cows did not lactate during the latter half of pregnancy. However, modern commercial cows might lactate almost in an entire period of pregnancy. Moreover, the lactating period was longer and milk production was higher in modern commercial cows than that in traditional cows.

Conclusions: The content of estrogen and progesterone in commercial milk in Chinese market detected might be higher than that in traditional milk.

6

Effect of synchronization of follicle-wave emergence with estradiol and progesterone and superstimulation with follicle-stimulating hormone on milk estrogen concentrations in dairy cattle

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Affiliations
PMID: 23814359   PMCID: PMC3525175

Abstract in English, French

Very little is known about the effects of hormonal synchronization of follicle waves and superovulation on the estrogen content of a cow's milk. The objective of this study was to determine the effect in dairy cows of synchronization with estradiol-17β (E2) and progesterone (P4) on milk E2 concentrations and to compare these levels with those achieved during superstimulation for 4 d with porcine follicle-stimulating hormone (FSH). The milk E2 concentrations were raised significantly above pretreatment levels ($P < 0.05$) for 2 d after synchronization, the mean peak being 40.2 ± 18.5 (standard error) pg/mL and the pretreatment mean 1.5 ± 0.5 pg/mL. The mean peak E2 concentration during ovarian stimulation was 4.4 ± 0.7 pg/mL. The mean E2 concentration was significantly higher ($P < 0.05$) after synchronization than during superstimulation for the 1st milking after synchronization but not subsequent milkings. The milk estrone concentrations were above pretreatment levels for 1 d after synchronization and were not different from those observed during superstimulation.

> 1 figure

7

Effects of gonadotropin-releasing hormone and human chorionic gonadotropin on pregnancy rate in dairy cattle

G S Lewis [1], D W Caldwell, C E Rexroad Jr, H H Dowlen, J R Owen

Affiliations
PMID: 2179307   DOI: 10.3168/jds.S0022-0302(90)78647-X

Abstract

This study was to determine if gonadotropin-releasing hormone, human chorionic gonadotropin, or their interaction would affect pregnancy rate or milk progesterone profiles in dairy cattle. Cows and heifers eligible for first, second, and third services were assigned to four treatments: 1) saline i.m. within 5 min after AI (d 0) and saline 15 d after AI (n = 222 AI); 2) gonadotropin-releasing hormone (100 micrograms) i.m. within 5 min after AI and saline on d 15 (n = 223); 3) saline after AI and human chorionic gonadotropin (3500 IU) i.m. on d 15 (n = 196); 4) gonadotropin-releasing hormone at AI and human chorionic gonadotropin on d 15 (n = 195). Progesterone was quantified in milk samples collected twice weekly for 5 wk from all cows. Neither gonadotropin-releasing hormone, human chorionic gonadotropin, gonadotropin-releasing hormone x human chorionic gonadotropin interaction, age, nor service number affected pregnancy rate, which averaged 46.2%. Pregnancy and human chorionic gonadotropin affected milk progesterone profiles. Pregnancy maintained progesterone concentrations and human chorionic gonadotropin on d 15 increased them. This study does not support the general use of gonadotropin-releasing hormone at AI or human chorionic gonadotropin 15 d after AI as methods for enhancing pregnancy rates of dairy cattle.

8

Concentrations of 17beta-estradiol in Holstein whole milk

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Affiliations
PMID: 17582116   DOI: 10.3168/jds.2006-891

Abstract

Some individuals have expressed concern about estrogens in food because of their potential to promote growth of estrogen-sensitive human cancer cells. Researchers have reported concentrations of estrogen in milk but few whole milk samples have been analyzed. Because estrogen associates with the fat phase of milk, the analysis of whole milk is an important consideration. The objectives of this study, therefore, were to quantify 17beta-estradiol (E2) in whole milk from dairy cows and to determine whether E2 concentrations in milk from cows in the second half of pregnancy were greater than that in milk from cows in the first half of pregnancy or in nonpregnant cows. Milk samples and weights were collected during a single morning milking from 206 Holstein cows. Triplicate samples were collected and 2 samples were analyzed for fat, protein, lactose, and somatic cell counts (SCC); 1 sample was homogenized and analyzed for E2. The homogenized whole milk (3 mL) was extracted twice with ethyl acetate and once with methanol. The extract was reconstituted in benzene:methanol (9:1, vol/vol) and run over a Sephadex LH-20 column to separate E2 from cholesterol and estrone before quantification using radioimmunoassay. Cows were classified as not pregnant (NP, n = 138), early pregnant (EP, 1 to 140 d pregnant, n = 47), or midpregnant (MP, 141 to 210 d pregnant, n = 21) at the time of milk sampling based on herd health records. Mean E2 concentration in whole milk was 1.4 +/- 0.2 pg/mL and ranged from nondetectable to 22.9 pg/mL. Milk E2 concentrations averaged 1.3, 0.9, and 3.0 pg/mL for NP, EP, and MP cows, respectively. Milk E2 concentrations for MP cows were greater and differed from those of NP and EP cows. Milk composition was normal for a Holstein herd in that log SCC values and percentages of fat, protein, and lactose averaged 4.9, 3.5, 3.1, and 4.8, respectively. Estradiol concentration was significantly correlated (r = 0.20) with percentage fat in milk. Mean milk yield was 18.9 +/- 0.6 kg for the morning milking. The mean E2 mass accumulated in the morning milk was 23.2 +/- 3.4 ng/cow. Likewise, using the overall mean concentration for E2 in milk, the mean E2 mass in 237 mL (8 fluid ounces) of raw whole milk was 330 pg. The quantity of E2 in whole milk, therefore, is low and is unlikely to pose a health risk for humans.

Cited by 1 article

9

Effect of hormonal treatments prior to lactation on hormones in blood plasma, milk, and urine during early lactation

R E Erb, B P Chew, H F Keller, P V Malven

PMID: 864043   DOI: 10.3168/jds.S0022-0302(77)83902-7

Abstract

PIP: Concentrations and rates of excretion of hormones into colostrum and milk were compared when lactation was caused by normal calving, premature calving induced with hormones, and treatment of nonpregnant dry cows with estradiol-17beta and progesterone. Blood plasma, colostrum, milk, and urine were studied through Day 25 of lactation in 6, 6, and 2 Holsteins, respectively. The treatments had no effect on concentrations of prolactin were higher in milk after induced calving. Concentrations of prolactin in colostrum were up to 8 times higher than in blood plasma. In milk the ratios decreased to near ratios of 1:1. Hormonal treatments had no effect on progesterone in plasma, colostrum, or milk. Differences in estrone, estradiol-17beta, estradiol-17alpha, and their total were observed after Day 2 of lactation. 3 days after normal calving concentrations of the estrogens in plasma and milk, and rates of excretion in urine and milk were lower than after induced calving. Estrone decreased proportionately more in milk postpartum than estradiol-17alpha. Proportions of each estrogen in mammary secretions resembled those in blood plasma prior to Day 3 of lactation and those in urine thereafter. Concentrations of estradiol-17alpha in milk were 3-10 times higher. Total estrogen was about twice as high as in blood plasma.

10

Comparison of progesterone-based protocols with gonadotropin-releasing hormone or estradiol benzoate for timed artificial insemination or embryo transfer in lactating dairy cows

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Affiliations
PMID: 21247621   DOI: 10.1016/j.theriogenology.2010.11.027

Abstract

The objective was to compare two protocols for synchronizing ovulation in lactating Holstein cows submitted to timed AI (TAI) or timed ET (TET). Within each farm (n = 8), cows (n = 883; mean ± SEM 166.24 ± 3.27 d postpartum, yielding 36.8 ± 0.34 kg of milk/d) were randomly assigned to receive either: 1) an intravaginal progesterone insert (CIDR®) with 1.9 g of progesterone + GnRH on Day -10, CIDR® withdrawal + PGF2α on Day -3, and 1 mg estradiol cypionate on Day -2 (treatment GP-P-E; n(TAI) = 180; n(TET) = 260); or 2) a CIDR® insert + 2 mg estradiol benzoate on Day -10, PGF2α on Day -3, CIDR® withdrawal + 1 mg estradiol cypionate on Day -2 (treatment EP-P-E; n(TAI) = 174; n(TET) = 269). Cows were subsequently randomly assigned to receive either TAI on Day 0 or TET on Day 7. Serum progesterone concentration on Day -3 was greater in GP-P-E than in EP-P-E (2.89 ± 0.15 vs 2.29 ± 0.15 ng/mL; P < 0.01), with no significant effect of group on serum progesterone on Day 7. Compared to cows submitted to TAI, those submitted to TET had greater pregnancy rates on Day 28 (44.0% [233/529] vs 29.7% [105/354]; P < 0.001) and on Day 60 (37.6% [199/529] vs 26.5 [94/354]; P < 0.001). However, there were no effects of treatments (GP-P-E vs EP-P-E; P > 0.10) on synchronization (87.0% [383/440] vs 85.3% [378/443]), conception (TAI: 35.3% [55/156] vs 33.8% [50/148]; TET: 50.7% [115/227] vs 51.3% [118/230]) and pregnancy rates on Days 28 (TAI: 30.5% [55/180] vs 28.7% [50/174]; TET: 44.2% [115/260] vs 43.9% [118/269]) and 60 (TAI: 27.2% [49/80] vs 25.9% [45/174]; TET: 38.8% [101/260] vs 36.4% [98/269]). In conclusion, GP-P-E increased serum progesterone concentrations on Day -3, but rates of synchronization, conception, and pregnancy were not significantly different between cows submitted to GP-P-E and EP-P-E protocols, regardless of whether they were inseminated or received an embryo.

Cited by 3 articles

11

A phenotypical approach to the effects of production traits, parturition, puerperium and body condition on commencement of luteal activity in high yielding dairy cows

Ariane Boldt [1], Frank Becker [2], Gunter Martin [3], Gerd Nürnberg [4], Anke Römer [1], Wilhelm Kanitz [5]

Affiliations
PMID: 25882649   DOI: 10.1016/j.anireprosci.2015.03.013

Abstract

The interval from calving to commencement of luteal activity (CLA) was determined by progesterone measurements from milk samples obtained once a week until the 14th week post-partum in 513 German Holstein cows in first to third parity. Milk samples were analyzed by an "on-farm" device (eProCheck(®), Minitüb, Germany) and simultaneously by RIA. The objective of this study was to examine the effect of milk yield, protein content and body condition of a cow on the CLA post-partum. Milk progesterone concentrations of "on-farm" measurements correlated with measurements done by the RIA-method significantly (r=0.72; P<0.001). Within the analyzed herd the interval from calving until the first rise of progesterone averaged 5.6±2.4 weeks. The 100-days milk yield was not associated with CLA. Cows with a milk protein content at 1st milk recording of ≤3.5% revealed first luteal activity 1.3±0.3 weeks later than cows that had a content of >3.75% protein (P<0.01). Furthermore cows with assisted calving or dystocia presented significantly later CLA than cows which required no help during the calving process (P<0.05). The

change in back fat thickness from 1st to 2nd milk recording had a significant influence on CLA (P<0.05). In conclusion the phenotypic impact of milk yield on fertility cannot be confirmed regarding to CLA. The negative energy balance after calving, caused by the high milk yields, is more detrimental for the cyclical activity as was shown by the parameters milk protein content and change in BFT.

Keywords: Body condition; Fertility; First luteal activity; Milk progesterone; Milk yield; Parturition.

12

Short communication: suppression of estrous cycles in lactating cows has no effect on milk production

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Affiliations
PMID: 16428633　DOI: 10.3168/jds.S0022-0302(06)72127-0

Abstract

The decline in milk yield observed after peak production in dairy animals results from apoptotic death of mammary epithelial cells. In cows, this decrease in milk yield can be accelerated by injection of 17beta-estradiol, thus evoking a possible role of estrogens in the regulation of bovine mammary gland involution. In nonpregnant cows, mammary involution could be induced or enhanced by the return of estrous cycles and the accompanying cyclic peaks of estrogen concentration in the serum of lactating animals. To test this hypothesis, we inserted implants of a GnRH agonist, deslorelin, in an ear of each cow (n = 10) on d 10 and 100 of lactation, to temporarily suppress the return of ovarian cycles. Cows were studied from calving to d 210 of lactation. Deslorelin had no impact on feed intake or animal health. Deslorelin significantly reduced serum concentrations of 17beta-estradiol and progesterone as compared with untreated cows (n = 10). Deslorelin had no effect on milk fat and protein, whereas milk lactose content was lower in treated cows than in control cows on d 100 of lactation. Finally, there was no difference in milk production between the 2 groups of cows. These results are consistent with previous observations that showed that delaying estrous cycles after calving had no effect on milk yield and they extend those observations to late lactation. Based on milk production data, the estrogen profiles associated with recurring estrous cycles apparently do not cause bovine mammary tissue to undergo gradual involution.

Cited by 3 articles

13

Characteristics and retention of luteal structures, extended postinsemination cycle, progesterone, and pregnancy-specific protein B in serum after human chorionic gonadotropin treatment of dairy cows

J S Stevenson [1], S L Pulley

Affiliations
PMID: 22818453　DOI: 10.3168/jds.2011-5286

Abstract

Our objectives were to determine characteristics (size, number, and stayability) of luteal structures formed in response to human chorionic gonadotropin (hCG) administered on d 7 after timed artificial insemination (AI) and the influence of hCG on returns to estrus and pregnancy outcome. Holstein cows (n=328), milked 3 times daily, previously inseminated at first service were assigned randomly to a completely

randomized design consisting of 2 treatments when at least 1 corpus luteum (CL) was detected on d 7 after AI. Treatment consisted of 1,000 IU hCG or 1 mL of saline (control) administered i.m. Blood was collected and luteal structures were mapped and sized by transrectal ultrasonography on d 7, 14, 21, 28, and 32 after AI. Blood also was collected on d 60 in all pregnant cows. Treatment with hCG induced new luteal structures in 70% of cows, regardless of pregnancy status or number of pretreatment CL. Cows producing greater than the median 46 kg of energy-corrected milk per day were less likely to respond to hCG. The number of total luteal structures per cow, original CL volume, and total luteal volume (original CL + new luteal structures) were increased by hCG. Progesterone concentration was greater in pregnant than nonpregnant cows on d 14 unless cows responded to hCG by forming new luteal structures. Concentrations of progesterone were greatest in pregnant, hCG-treated cows. Pregnancy per AI at d 32 or 60 after first AI was less in hCG- than saline-treated cows because pregnancy outcome for hCG cows that had only 1 pretreatment CL and failed to respond to hCG was only 55 to 61% of that observed in controls. Proportions of cows returning to estrus from 18 to 25 d after AI were less in hCG than control cows but greater for cows returning >25 d. Regardless of treatment, 25% of cows in both treatments retained at least 1 original CL to d 28 after AI and were not pregnant on d 32. Progesterone concentrations in these nonpregnant cows with retained CL between d 14 and 28 after AI were intermediate between nonpregnant cows that returned to estrus by d 25 and all pregnant cows. Concentrations of pregnancy-specific protein B were elevated in some of these nonpregnant, CL-retained cows, indicating early pregnancy loss. Retention of original luteal tissue in nonpregnant cows to d 28 after AI indicated that pregnancy had been initiated but failed, as verified by concentrations of progesterone and pregnancy-specific protein B.

14

Development of a quantum dot-based fluorescent immunoassay for progesterone determination in bovine milk

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Affiliations
PMID: 21700445   DOI: 10.1016/j.bios.2011.05.044

Abstract

The use of semiconductor quantum dots (QDs) as fluorescent labels to develop a competitive immunoassay for sensitive detection and quantification of progesterone in cow's milk is described. Colloidal water-soluble CdSe/ZnS QDs are conjugated to an antigen derivative (progesterone-BSA conjugate) and a simple methodology is optimised to determine the antigen concentration in the final bioconjugate. The obtained QD-linked antigens were then employed together with unlabelled anti-progesterone monoclonal antibodies, as the biological recognition elements, in the development of the quantitative QDs-based fluorescent immunoassay for progesterone in bovine milk. After optimization, the developed immunoassay proved to cover a progesterone concentration range from 0.3 to 14.5 ng/mL in cow milk. Milk samples were just diluted 10-fold with deionised water and directly analysed with the proposed immunoassay, without additional sample pre-treatment or analyte extraction. The minimum detectable level (IC(10)) of the developed immunoassay turned out to be 0.1 ng/mL of progesterone in bovine milk. The sensitivity (IC(50)) achieved was 2.2 ng/mL with a reproducibility of 3.5% RSD as obtained from the results of the analysis of the triplicate of same samples but in three different days. Applicability of the proposed methodology was evaluated by analyzing cow's milk samples enriched with known concentrations of progesterone and recoveries better than 90% were achieved.

Cited by 2 articles

15

Rapid flow-through enzyme immunoassay of progesterone in whole cows' milk

Jeanne V Samsonova [1], Valentina A Safronova [2], Alexander P Osipov [3]

Abstract

A rapid flow-through immunoassay using an enzyme (horseradish peroxidase) as a label for quantitative and semi-quantitative determination of progesterone in whole cows' milk was developed. The flow-through test device consisted of a porous nitrocellulose membrane coated with antibodies and an absorbent membrane. The substrate solution containing 3,3',5,5' -tetramethylbenzidine was used for colour visualization. The detection limit of 0.4 ng/mL P4 was obtained by this method; analysis time did not exceed 15 min. To eliminate matrix interference a simple sample preparation procedure was used. Results of analysis of whole cows' milk samples with flow-through method were in good correlation with ELISA results (R = 0.96, n = 34). The developed rapid flow-through test system showed high efficiency for the determination of progesterone level in whole cow's milk and can be used on-site for quick identification of milk samples with low and high progesterone concentration.

Keywords: Flow-through enzyme immunoassay; Horseradish peroxidase; Progesterone; Whole cows' milk.

Cited by 4 articles

16

Incidence and treatment of inadequate postovulatory progesterone concentrations in repeat breeder cows

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Affiliations
PMID: 18620878   DOI: 10.1016/j.tvjl.2008.02.015

Abstract

The incidence of low day 5 milk progesterone in dairy cows has been investigated and the efficacy of treating the problem assessed. The incidence of inadequate milk progesterone (empirically defined as <3ng/mL) in repeat breeder cows was 34% compared with 11.4% in first insemination cows. Treatment with an intravaginal progesterone device for 7 days starting from day 5 or 6 did not improve pregnancy rate. Treatment with 1500 iu human chorionic gonadotrophin (hCG) on day 5 gave an increase in pregnancy rate that was dependent on initial progesterone concentration and significant (P<0.05) in multiparous but not primiparous cows. While the incidence of inadequate day 5 progesterone was high in repeat breeder cows, it was responsive to hCG treatment, although only in multiparous and not primiparous animals.

17

Determination of steroid hormones in bovine milk by LC-MS/MS and their levels in Swiss Holstein cow milk

Alexandre Goyon [1], Julia Zhenzhen Cai [2], Karin Kraehenbuehl [1], Christoph Hartmann [2], Bing Shao [3], Pascal Mottier [1]

Affiliations
PMID: 27055356   DOI: 10.1080/19440049.2016.1175186

Abstract

Synthetic and natural steroid hormones have attracted some attention in recent years as endocrine active substances (EAS) that interact or interfere with the endocrine system. Endogenous hormones occur naturally in food of animal origin, among which bovine milk represents an important source. This study was conducted to determine the occurrence of steroid hormones (oestrogens, androgens, progestogens and glucocorticoids) in cow's milk samples from three farms in Switzerland. An isotope dilution liquid chromatography-tandem mass spectrometry (LC-MS/MS) method was developed and validated for the quantification of 12 hormones in milk. Some hormonal levels from individual cows showed large variations. The average levels of the hormones analysed (17α-estradiol = 31 ng kg(-)(1), 17β-estradiol = 6 ng kg(-)(1), estrone = 159 ng kg(-)(1), 4-androstenedione = 684 ng kg(-)(1), progesterone = 15486 ng kg(-)(1), 17-hydroxyprogesterone = 214 ng kg(-)(1), cortisone = 112 ng kg(-)(1), and cortisol = 235 ng kg(-)(1)) were comparable with literature data. Estriol, testosterone and androstenediols were not detected at their respective limit of quantification. No significant differences of hormonal content among milk from cows at different lactation/calving numbers were evidenced, except for progesterone and 4-androstenedione. Due to confounding parameters linked to the physiological stage of the animal, like pregnancy and gestational stage (pregnancy trimester), the causal correlation between the variation of the levels for these two hormones and the lactation/calving number could not be unambiguously demonstrated.

Keywords: Bovine milk; LC-MS/MS; androgens; endocrine active substances (EAS); glucocorticoids; hormones; oestrogens; progestogens; steroids.

Cited by 4 articles

18

The possible role of female sex hormones in milk from pregnant cows in the development of breast, ovarian and corpus uteri cancers

Davaasambuu Ganmaa [1], Akio Sato

Affiliations
PMID: 16125328   DOI: 10.1016/j.mehy.2005.06.026

Abstract

The continued increase in incidence of some hormone-related cancers worldwide is of great concern. Although estrogen-like substances in the environment were blamed for this increase, the possible role of endogenous estrogens from food has not been widely discussed. We are particularly concerned about cows' milk, which contains a considerable quantity of estrogens. When we name cows' milk as one of the important routes of human exposure to estrogens, the general response of Western people is that "man has been drinking cows' milk for around 2000 years without apparent harm." However, the milk that we are now consuming is quite different from that consumed 100 years ago. Unlike their pasture-fed counterparts of 100 years ago, modern dairy cows are usually pregnant and continue to lactate during the latter half of pregnancy, when the concentration of estrogens in blood, and hence in milk, increases. The correlation of incidence and mortality rates with environmental variables in worldwide countries provides useful clues to the etiology of cancer. In this study, we correlated incidence rates for breast, ovarian, and corpus uteri cancers (1993-97 from Cancer Incidence in Five Continents) with food intake (1961-97 from FAOSTAT) in 40 countries. Meat was most closely correlated with the breast cancer incidence (r=0.827), followed by milk (0.817) and cheese (0.751). Stepwise multiple-regression analysis (SMRA) identified meat as the factor contributing most greatly to the incidence of breast cancer ([R]=0.862). Milk was most closely correlated with the incidence of ovarian cancer (r=0.779), followed by animal fats (0.717) and cheese (0.697). SMRA revealed that milk plus cheese make the greatest contribution to the incidence of ovarian cancer ([R]=0.767). Milk was most closely correlated with corpus uteri cancer (r=0.814), followed by cheese (0.787). SMRA revealed that milk plus cheese make the most significant contribution to the incidence of corpus uteri cancer ([R]=0.861). In conclusion, increased consumption of animal-derived food may have adverse effects on the development of hormone-dependent cancers. Among dietary risk factors, we are most concerned with milk and dairy products, because the milk we drink today is produced from pregnant cows, in which estrogen and progesterone levels are markedly elevated.

Cited by 21 articles

19

Use of concentrations of progesterone and estradiol-17 beta in milk in monitoring postpartum ovarian function in dairy cows

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Affiliations
PMID: 3680735   DOI: 10.3168/jds.S0022-0302(87)80268-0
Free article

Abstract

Data from artificial insemination, rectal palpation, and hormone assays were used to characterize postpartum reproductive activity in 54 dairy cows. Progesterone and estradiol-17 beta were measured in milk samples collected for 120 d (Trial 1) or 65 d (Trial 2). Progesterone was higher and estradiol was lower in milk than in serum. Values for both hormones in milk were highly correlated with those in serum. Most cows (64%) had short first luteal phases (less than or equal to 12 d). First rise (28 d) in progesterone was later (33.4 vs. 24.9 d) for cows having short rather than normal (greater than 12 d) luteal phases. Cows were classified as having a short luteal phase followed by a normal luteal phase or as having normal luteal phases for the first two estrous cycles. Estradiol for the 6 d prior to each luteal phase was higher preceding the second phase than the short phase or those preceding both phases of cows with normal phases. Follicular function prior to ovulation, as measured by estradiol, was not responsible for short-lived corpora lutea. Concentrations of progesterone in milk in the late luteal phase prior to insemination were related to fertility.

Cited by 1 article

20

Concentrations of progesterone in milk of cows administered an intravaginal progesterone insert

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Affiliations
PMID: 12836941   DOI: 10.3168/jds.S0022-0302(03)73794-1
Free article

Abstract

Milk from pregnant cows contains concentrations of progesterone (P4) considered safe for human consumption. The objective of this study was to determine if concentrations of P4 in milk during administration of an intravaginal progesterone insert (CIDR insert) are less than concentrations of P4 in milk associated with pregnancy. Results have implications for human use of milk from cows receiving CIDR inserts. Holstein cows (N = 64; > 40 and < 150 d after calving) were administered 25 mg of PGF2alpha i.m. (study d 0) and 20 cows detected in estrus from 2 to 4 d later were assigned randomly to either control (N = 10; no further treatment) or CIDR insert (N = 10; 1.38 g of P4) inserted on study d 17 (14 +/- 1 d after estrus) and removed 7 d later. Composite milk samples were collected contemporaneously from each of the 20 estrous cycling cows and from 10 pregnant cows (> or = 60 and < or = 220 d of gestation) twice daily from study d 17 to 27. Concentrations of P4 in defatted milk samples were quantified using a validated radioimmunoassay. Mean logs of areas under the curve of concentrations of P4 from the afternoon on study d 17 through the afternoon on study d 27 were 3.05 ng day/ml for control, 3.33 ng day/ml for CIDR insert, and 3.81 ng day/ml for pregnant cows. Therefore, increased P4 due to pregnancy was 0.76 ng day/ml (3.81-3.05), whereas the increase in P4 due to CIDR insert was only 0.28 ng day/ml (3.33-3.05). Applying a 95% confidence interval to 0.28 ng day/ml provided an upper value of 0.70 ng day/ml, lower than the increase due to pregnancy. Because milk from pregnant cows is considered safe for human consumption, it follows that milk from cows administered CIDR inserts should also be considered safe, based on concentrations of P4.

21

Changes of luteinizing hormone and progesterone for dairy cows after gonadotropin-releasing hormone at first postpartum breeding

C N Lee, J K Critser, R L Ax

Abstract

Gonadotropin-releasing hormone administered at breeding enhances fertility of dairy cows, so a study was designed to evaluate the mechanism for enhanced fertility following administration of gonadotropin-releasing hormone at first postpartum breeding. Twenty-four cows were assigned randomly to one of two treatments, 100 micrograms of gonadotropin-releasing hormone intramuscular or saline vehicle intramuscular at insemination. Blood samples for luteinizing hormone assay were taken at 2-h intervals prior to breeding and .5-h intervals for 3 h after insemination. Composite morning milk samples for progesterone assay were collected for 30 days after insemination or until next estrus. Cows given gonadotropin-releasing hormone had higher luteinizing hormone concentrations in blood serum following treatment than cows given saline, 13.2 versus 3.0 ng/ml. There was no relationship between luteinizing hormone and subsequent conception. Progesterone for cows that became pregnant was higher throughout sampling days. Mean progesterone concentrations were 4.6 versus 2.2 ng/ml in pregnant and nonpregnant cows during the first 4 days after insemination. Cows treated with gonadotropin-releasing hormone that conceived had higher progesterone than other cows, and that was evident at the first 4 days postbreeding.

Cited by 1 article

22

Comparative Study   Am J Vet Res. 1983 May;44(5):888-90.

Use of milk progesterone enzyme immunoassay for differential diagnosis of follicular cyst, luteal cyst, and cystic corpus luteum in cows

T Nakao, A Sugihashi, N Saga, N Tsunoda, K Kawata

Abstract

In 160 cows with ovarian cysts as determined by rectal palpation, differentiation was made of follicular cyst, luteal cyst, and cystic corpus luteum on the basis of milk progesterone concentrations estimated by an enzyme immunoassay before and at 10 days after cows were treated with gonadotropin-releasing hormone. Cows having a progesterone concentration in skim milk less than 1.0 ng/ml were considered to have follicular cysts and those with concentrations of 1.0 ng/ml or higher were regarded as the cases of luteal cyst or cystic corpus luteum. Luteal cyst was characterized by progesterone values remaining high in the cows for 10 days after treatment, and cystic corpus luteum was characterized by a decrease in progesterone concentration after cows were treated. By the rectal palpation procedure it was impossible to differentiate luteal cyst and cystic corpus luteum from follicular cyst. The frequencies of follicular cyst, luteal cyst, and cystic corpus luteum were 65%, 19%, and 16%, respectively. Of 104 cows with follicular cysts as defined by milk progesterone assay result, 73 (70%) responded to the treatment with gonadotropin-releasing hormone, the milk progesterone concentration increasing from 0.7 +/- 0.2 ng/ml (mean +/- SD) to 1.8 +/- 1.1 ng/ml. The accuracy of rectal palpation 10 days after treatment for judgment of luteinization of follicular cyst confirmed by milk progesterone analysis was only 30% (48 cows of 160).

Cited by 1 article

23

Am J Vet Res. 1976 Feb;37(2):153-7.

Effect of gonadotropin-releasing hormone and human chorionic gonadotropin on cows with ovarian follicular cysts

B E Seguin, E M Convey, W D Oxender

PMID: 769609

Abstract

Ovarian follicular cysts of cattle were defined as follicular structures (larger than or equal to 2.5 cm, diameter) which persisted for 10 days or longer in the absence of functional luteal tissue. Thirty dairy cows with ovarian follicular cysts were allotted to 6 groups (5 cows per group) and each was given 0 (saline solution), 25, 50, 100, 150, or 250 mug of gonadotropin-releasing hormone (GnRH) by intramuscular (IM) injection. Samples of blood were collected before GnRH was injected (0 hour), at 0.25, 0.50, 0.75, 1, 2, 3, and 4 hours, and at 1, 7, 11, 15, and 20 days after treatment. Five additional cows with follicular cysts were treated IM with 10,000 units of human chorionic gonadotropin (HCG), and blood sample collections were made before treatment (0 hour) and on days 1, 7, 11, 15, and 20 after treatment. Serum luteinizing hormone (LH) concentration was not altered in cows given saline solution, but was increased significantly in cows given any of the doses of GnRH (in a dose-related manner). Peak LH responses occurred about 2 hours after GnRH was given, and by 4 hours LH was beginning to decrease. Serum progesterone concentrations increased by more than 2.0 ng/ml by day 11 after treatment in 18 of 20 cows treated with 50, 100, 150, or 250 mug of GnRH. Progesterone responses in these cows were greater (P less than 0.05) than in cows given saline solution or a 25-mug dose of GnRH. Mean progesterone response to the 4 large doses of GnRH was similar in magnitude and duration to serum progesterone changes during the leutal phase of the bovine estrous cycle. After cows were treated with HCG, serum progesterone values were similar to those in cows given GnRH (50 to 250 mug).

24

Starch source and content in postpartum dairy cow diets: effects on plasma metabolites and reproductive processes

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Affiliations
PMID: 21854936   DOI: 10.3168/jds.2010-4056

Abstract

The objective of this study was to examine the effects of dietary starch source and content in the immediate postpartum period on plasma metabolites and hormones and ovarian follicular development. One of 3 diets was fed in a randomized block design to 40 cows from calving until 70 d in milk. The diets contained 45% alfalfa silage (AS), 45% barley silage (BS), or 41% barley silage and 4% supplemental starch (SS) on a dry matter basis. All diets contained 45% barley-based concentrate and 10% alfalfa hay. Resulting starch levels were 25.2, 23.3, and 26.7% for AS, BS, and SS, respectively. Body condition was scored every other week and dry matter intake and milk yield were recorded daily. Milk samples were obtained weekly and blood samples were taken at calving and then every other week to determine concentrations of glucose, insulin, insulin-like growth factor-1, β-hydroxybutyrate, and nonesterified fatty acids. Transrectal ultrasonography was performed twice per week from 7 d after calving until first ovulation or 62 d in milk in all cows. For a subset of 7 AS-, 8 BS-, and 9 SS-fed cows, a complete estrous cycle was monitored for ovarian dynamics, and blood samples were collected every second day for progesterone and estradiol. Luteinizing hormone pulsatility was also determined (5 cows/treatment) approximately 15 d postcalving. Treatment had no effect on body condition score, dry matter intake, blood metabolites, milk yield, or milk fat and protein contents, but BS-fed cows had significantly higher levels of milk urea nitrogen compared with SS cows. Cows fed SS (31 d) tended to have a shorter interval from calving to first ovulation than cows fed AS (43 d) or BS (38 d). The incidence of double first ovulations was higher in cows fed SS (46%) compared with those fed BS (0%). Treatment had no effect on LH pulse frequency or amplitude, ovarian dynamics, or progesterone and estradiol concentrations during the observed estrous cycle. Energy balance did not differ among cows fed the 3 diets. Overall, dietary starch source and concentration had little effect on productivity or metabolic status of postpartum cows.

Cited by 1 article

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Progesterone concentration, pregnancy and calving rate in Simmental dairy cows after oestrus synchronisation and hCG treatment during the early luteal phase

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Affiliations
PMID: 28956489　DOI: 10.1556/004.2017.042

Abstract

Early embryonic development may be negatively affected by insufficient progesterone (P4) production. Therefore, the aim of our study was to increase P4 by gonadotropin-releasing hormone (GnRH) and/or human chorionic gonadotropin (hCG) treatments after inducing oestrus by prostaglandin (PG) treatment. Lactating Simmental dairy cows (n = 110), between 1 to 5 lactations, with an average milk production of 6,500 1/305 days, at 40-80 days postpartum were used and grouped as follows: (1) PG + GnRH treatment at AI (GnRH group), (2) PG + hCG treatment at day 7 after AI (hCG group), (3) PG + GnRH at AI + hCG treatment at day 7 after AI (GnRH/hCG group), and (4) spontaneous oestrus (C: control group). All animals were double inseminated (at the time of oestrus detection and 12 ± 2 h thereafter). Blood serum and milk samples were collected at the day of observed oestrus (day 0), and 14, 21 and 28 days after AI. Serum P4 was determined using a commercial radioimmunoassay (RIA) test (INEP, Zemun), and milk P4 was determined using enzyme-linked immunoassay (ELISA) test (NIV Novi Sad). Pregnancy status was confirmed by ultrasonography between days 28 and 35 after AI. Differences of serum or milk P4 medians, pregnancy (and calving) rate were determined using Dunn's Multiple Comparison Tests and Z test, respectively. Serum P4 medians were significantly higher at days 14, 21 and 28 after AI in the hCG-treated animals, indicating increased luteal activity, with a similar tendency in whole milk P4 values. Treatment with hCG during the early luteal phase significantly contributed to the maintenance of gestation at days 28-35 after AI, and also increased the calving rate in Simmental dairy cows.

Keywords: Progesterone; Simmental dairy cows; calving rate; oestrus synchronisation; pregnancy rate.

26

Effect of monensin and vitamin E on milk production and composition of lactating dairy cows

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Affiliations
PMID: 22533457　DOI: 10.1111/j.1439-0396.2012.01307.x

Abstract

Feeding unsaturated oils to lactating dairy cows impair ruminal biohydrogenation (BH) of unsaturated fatty acids (USFA) and increase ruminal outflow of BH intermediates such as trans-10, cis-12 CLA that are considered to be potent inhibitors of milk fat synthesis. Supplementing lactating dairy cow's rations containing plant origin oils with monensin and/or vitamin E may minimise the formation of trans-10 isomers in the rumen, thereby preventing milk fat depression. Therefore, this study was conducted to evaluate the effects of monensin and vitamin E supplementation in the diets of lactating dairy cows containing whole cottonseed, as the main source of FA on feed intake, milk production and composition, milk fatty acid profile, efficiency of nitrogen (N) utilisation, efficiency of net energy (NE) utilisation and nutrients digestibilities. Four

multiparous Holstein lactating dairy cows (86±41 days in milk) were assigned to a balanced 4 × 4 Latin square design. Each experimental period lasted 21 days with a 14 days of treatment adaptation and a 7 days of data collection. The control diet was a total mixed ration (TMR) consisted of 430 g/kg forage and 570 g/kg of a concentrate mixture on dry matter (DM) basis. Cows were randomly assigned to one of the four dietary treatments including control diet (C), control diet supplemented with 150 mg of vitamin E/kg of DM (E), control diet supplemented with 24 mg of monensin/kg of DM (M) and control diet supplemented with 150 mg of vitamin E and 24 mg of monensin/kg of DM (EM). Dry matter intake (DMI) ranged from 19.1 to 19.5 kg/d and was similar among the dietary treatments. Dietary supplementation with vitamin E or monensin had no effect on milk production, milk fat, protein and lactose concentrations, efficiency of utilisation of nitrogen and net energy for lactation (NEL). Digestibility of DM, organic matter (OM), crude protein (CP) and ether extract (EE) was not affected by the dietary treatments. Digestibility of neutral detergent fibre (NDF) was higher in cows fed with the M and EM diets in relation to those fed the C and E diets. The concentrations of C4:0, C6:0, C8:0, C10:0, C12:0, C14:0, C15:0, trans-10-16:1, cis-9-16:1, 17:0, 18:0, trans-11-18:1, cis-9-18:1, cis-9, trans-11 conjugated linoleic acid (CLA), trans-10, cis-12 CLA, and 18:3n-3 FA in milk fat were not affected by the dietary supplementations. While feeding the M diet tended to decrease milk fat concentration of C16:0, the milk fat concentration of C18:2n-6 FA tended to be increased. Dietary supplementation with vitamin E or monensin had no effect on milk fat concentrations of saturated, unsaturated, monounsaturated, polyunsaturated, short chain and long chain FA, but feeding the M diet numerically decreased milk fat concentration of medium chain fatty acids (MCFA). The results showed that vitamin E and/or monensin supplementations did not improve milk fat content and did not minimise the formation of trans-10 FA isomers in the rumen when whole cottonseed was included in the diet as the main source of fatty acids.

Cited by 1 article

27

Effect of a high cornstarch diet on hepatic cytochrome P450 2C and 3A activity and progesterone half-life in dairy cows

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Affiliations
PMID: 20172221   DOI: 10.3168/jds.2009-2539

Free article

Abstract

In the cow, inadequate concentrations of progesterone during gestation may lead to an abrupt termination of pregnancy. The primary organ involved in progesterone catabolism is the liver, which contains an abundance of cytochrome P450 isozymes (EC 1.14.14.1; mixed-function monooxygenases). The objectives of the current experiment were to determine the effect of feeding 2 isoenergetic and isonitrogenous diets, formulated to cause divergent insulin secretion, on hepatic cytochrome P450 2C (CYP2C) and 3A (CYP3A) activity as well as the resulting biological half-life of progesterone. Twenty-two Holstein cows averaging 80+/-7 d in milk were randomly assigned to either a high cornstarch diet or a high fiber diet in a crossover experimental design consisting of two 14-d periods. Dry matter intake, milk yield, milk lactose yield, and milk lactose percentage were similar between the 2 diets. Milk fat yield and milk fat percentage were higher in cows fed the high fiber diet, whereas milk protein yield tended to be higher and milk protein percentage was higher in cows fed the high cornstarch diet. Energy balance tended to be improved by 57% in cows consuming the high cornstarch diet. Insulin concentrations at the time of liver biopsy (3.16+/-0.04h post-feeding) were increased by 44% in cows consuming the high cornstarch diet compared with cows consuming the high fiber diet. Cytochrome P450 2C activity was decreased by 45%, whereas CYP3A activity tended to be lowered by 34% in cows consuming the high cornstarch diet. Cytochrome P450 2C mRNA expression tended to be decreased by 21% in cows fed the high cornstarch diet, whereas CYP3A mRNA expression was not different between the dietary treatments. The fractional rate constant of progesterone decay was not different between the 2 diets; however, the half-life of progesterone tended to be longer in cows fed the high cornstarch diet compared with cows fed the high fiber diet (85 vs. 64min, respectively). In summary, cows consuming the high cornstarch diet had increased insulin concentrations and lower hepatic CYP2C and CYP3A activity and tended to have a longer progesterone half-life compared with cows consuming the high fiber diet. Feeding diets that stimulate insulin secretion could alter progesterone clearance during lactation, when dairy cows have increased rates of progesterone inactivation because of high energy demands and increased DMI.

Cited by 6 articles

28

The effect of a chronic stressor, lameness, on detailed sexual behaviour and hormonal profiles in milk and plasma of dairy cattle

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Affiliations
PMID: 18992112　DOI: 10.1111/j.1439-0531.2008.01263.x

Abstract

The objectives of the present study were to quantify the effects of a biological chronic stressor (lameness) on the duration and frequency of different oestrous behaviours in parallel with milk hormone profiles. Dairy cows 51.8 +/- 1.4 days postpartum (n = 59), including 18 non-lame control cows, were scored for lameness and closely observed for signs of oestrus having had their follicular phases synchronized by administration of gonadotrophin-releasing-hormone (GnRH) followed by prostaglandin F(2alpha) (PG) 7 days later. Lameness shortened the period when herd-mates attempted to mount the lame cows (1.83 +/- 0.69 h vs 5.20 +/- 1.53 h; p = 0.042) but did not affect the overall duration of total behaviours (lame 12.3 +/- 1.3 h vs non-lame 15.2 +/- 1.3 h). Lameness also lowered the intensity of oestrus [1417 +/- 206 points (n = 18) vs 2260 +/- 307 points (n = 15); p = 0.029]. Throughout the synchronized oestrous period, lame cows mounted the rear of herd-mates less frequently (p = 0.020) and tended to chin rest less (p = 0.075). Around the period of maximum oestrous intensity, lameness also diminished the proportion of cows mounting the rear of another cow and chin resting (p = 0.048, p = 0.037, respectively). Furthermore, lame cows had lower progesterone values during the 6 days before oestrous (p < or = 0.05). Fewer lame cows were observed in oestrus following PG (non-lame 83%, lame 53%; p = 0.030); however, if prior progesterone concentrations were elevated, lame cows were just as likely to be observed in oestrus. In conclusion, following endogenous progesterone exposure, lameness shortens the period when herd-mates attempt to mount lame cows but does not affect the incidence of oestrous. However, lame cows are mounted less frequently and express oestrus of lower intensity. This is associated with lower progesterone prior to oestrus but not with abnormal oestradiol or cortisol profiles in daily milk samples.

Cited by 9 articles

29

Milk progesterone enzyme immunoassay: modifications and a field trial for pregnancy detection in dairy cows

T H Wimpy, C F Chang, V L Estergreen, J K Hillers

PMID: 3522679　DOI: 10.3168/jds.S0022-0302(86)80509-4
Free article

Abstract

A milk progesterone enzyme immunoassay was modified to shorten the antibody:antigen incubation time and tested in a field trial. Coupling the antibody to paper fibers at pH 7 increased the binding activity of the paper-antibody conjugate to allow incubation for 3 h at room temperature with no significant loss of competitive binding of progesterone. The relationship between progesterone concentrations measured by the modified and original enzyme immunoassays was r = .94 (n = 80 pairs). Milk samples (n = 67) collected 21 d after artificial insemination were classified by the original and modified methods as being from pregnant or nonpregnant cows using both spectrophotometric and visual evaluations. Comparison to subsequent rectal palpation or return to estrus showed that the two methods were comparable. A field trial was conducted involving 622 cows and 40 producers using the modified enzyme immunoassay method. The overall field trial accuracy of the enzyme immunoassay in diagnosing the cow's reproductive status for a single sample on d 21 after breeding was 71% for correct diagnosis of pregnancy

and 81% for correct diagnosis of nonpregnancy. It was concluded that the modified method is a valuable technique for rapid monitoring of milk progesterone concentrations.

Cited by 1 article

30

Pilot study: tendency of increasing iodine content in human milk and cow's milk

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Affiliations
PMID: 15662589   DOI: 10.1055/s-2004-830508

Abstract

The iodine supply in Germany has improved throughout the last decade, albeit with enormous differences between individuals and regions. In the Thuringian city of Jena, analyses of the iodine content of human milk have been undertaken regularly since 1982. Significantly increasing iodine concentrations in human and cow's milk have been found. Therefore, the current situation and the effectiveness of measures to prevent iodine deficiency demands re-evaluation. The iodine content of human milk from 32 lactating mothers was analysed on the 5th day (mean) postpartum and mothers' dietary iodine intake during the last two months of pregnancy was assessed by means of a food frequency questionnaire. To corroborate the assumption that the increasing iodine levels of cow's milk are one of the main reasons for the improved iodine supply, the iodine concentration of 34 cow's milk bulk-samples was also determined. Both human and cow's milk samples were analysed by the ICP-MS method. Twenty women took iodine supplements (mean daily intake = 175 microg). The average daily iodine intake of the 20 supplemented and 12 non-supplemented women was 258 microg and 116 microg, respectively. Daily iodine intake from food and beverages was significantly lower in supplemented women (83 microg/day). The average iodine content of human milk was 169 +/- 88 microg/l with a range of 33 - 348 microg/l. This content is two times higher than levels from 1994 in the same area. There was no difference in the human milk iodine content between mothers taking supplements and those who did not. Cow's milk samples showed a mean iodine concentration of 178 +/- 131 microg/l (range 48 - 661 microg/l).

Cited by 4 articles

31

New RIA kit for the determination of progesterone in cows' milk

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Affiliations
PMID: 16827229   DOI: 10.1080/15321810600734976

Abstract

A new, single-step, specific, simple, economical, and ready to use RIA test for the determination of progesterone in cow's milk was developed. Tubes coated with the specific polyclonal anti-progesterone antibody and progesterone-CMO-125I-histamine as the tracer were used. Progesterone in buffer and fat-free cow's milk, without progesterone were the matrix for the standard curve preparation. Fifty microL of milk and 500 microL of tracer were incubated in the tube for 2 h at room temperature, decanted, and coated. Assay range was 0-270 nmol of progesterone x 1(-1); sensitivity, <1 nmol x 1(-1); recovery, 94-104%; precision as CV%, 2.44-6%.

32

Endogenous anabolic agents in farm animals

W Velle

PMID: 782866

Abstract

This presentation is limited to the three groups of steroid sex hormones which alone or in combination have been shown to be anabolic when used in farm animals. It seems essential for realistic evaluation of public health aspects of use of these hormones that the discussions include naturally occurring levels of the hormones. The following topics will be dealt with for each group of hormones: 1. Types and sources; 2. Production rates; 3. Plasma levels; 4. Tissue concentrations; 5. Metabolism and excretion. Gestagens. Progesterone and 20-dihydroprogesterones are mainly produced in ovaries and placenta. Production rates are estimated to 10 and 14 mg/24 hrs in pregnant goats and sheep, respectively. Plasma levels during the luteal phase are of the order of 2--10 ng/ml, during pregnancy somewhat higher. Muscular tissue from calves contain 0.25 mg/g. In dairy cows progesterone is excreted with the milk which contains up to 30 ng/ml; butterfat up to 300 mg/g. In ruminants progesterone is metabolized mainly to androgens excreted with faeces. In pigs large parts are metabolized to pregnanediols excreted with urine. Androgens. Testosterone is mainly secreted by testes. Boar testes also produce large amounts of dehydroepiandrosterone and its sulphate. Production rates have been estimated to be 10 mg and 40--50 mg/24 hrs. in boars and bulls respectively. Plasma levels in bulls and rams are generally 2--10 ng/ml, in boars 2--25 ng/ml. Adipose tissue levels up to 22 ng/g are reported for bulls. In ruminants epitestosterone seems to be a major metabolite excreted mainly with faeces. In boars, urinary 11-deoxy-17-ketosteroids are major metabolites of testicular dehydroepiandrosterone. Castration shows elimination to be rapid. Estrogens. 17beta-Estradiol and estrone are produced in ovaries and placenta and, in large amounts, in boar and stallion testes. Production rates in late pregnancy are estimated to 10 mg oestrone/24 hrs. in goats, 2 mg estrone and up to 28 mg 17beta-estradiol/24 hrs. in sheep. In cows much higher values are found. Boars and stallions produce huge amounts daily. Plasma levels in non-pregnant animals are at the pg/ml level. In late pregnancy levels of 2--4 thousand pg/ml are encountered in sows and cows, in sheep and goats lower levels. Calf muscular tissue contains up to 410 and 610 pg/g of estrone and 17beta-estradiol respectively. In muscle from pregnant heifers corresponding values were 120 and 860 pg/g in the 4th month and 2100 and 370 pg/g in the 9th month of pregnancy. Ruminants in large measure metabolize 17 beta-estradiol and estrone to 17alpha-estradiol which possesses low estrogenic activity. In pigs estrone dominates in blood and urine. Major routes of elimination arre with faeces in ruminants, with urine in pigs and horses. Elimination rates are high. Results obtained during the last few years clearly show that all three groups of steroid sex hormones occur in considerable concentrations in plasma and tissue...

33

Detection of estrus in dairy cows by electrical measurements of vaginal mucus and by milk progesterone

P Gartland, J Schiavo, C E Hall, R H Foote, N R Scott

PMID: 1270655   DOI: 10.3168/jds.S0022-0302(76)84307-X

Abstract

Electrical resistance (ohms) of mucus were analyzed in 20 postpartum Holstein cows by use of a probe inserted into the anterior vagina every other day for 30 days. Composite milk samples were taken on the same day, and progesterone was determined by radioimmunoassay. Cows were observed twice daily for standing estrus and reproductive organs palpated weekly per rectum (rectal palpation). Fifteen cows which were cycling showed increasing progesterone 6 to 7 days after the onset of estrus with values of 8.1 to 10.0 ng progesterone/ml milk on days 10 to 17. Concentrations had declined rapidly 2 days before onset of the next estrus. Progesterone in milk was affected by cow and by day of the cycle. Electrical resistance followed a similar cyclical pattern, but variability was large and only cows differed. The correlation between milk progesterone and mucus resistance was .22. Progesterone concentrations for four cows with follicular cysts fluctuated randomly with a mean of

2.6 ng/ml. Mean resistance of vaginal mucus was 44 omega for both cycling and cystic cows, indicating that a single measurement of electrical resistance every 2nd day was unreliable in distinguishing physiological states. One cow had high progesterone in milk on days 19 to 25 and was diagnosed pregnant by rectal palpation 3 wk later. Cows were not seen in estrus 28% of the time when milk progesterone and rectal palpation indicated they were in the follicular phase of the estrous cycle and were cycling.

PIP: A technique for detecting estrus in dairy cows is reported. The technique involves the measurement of electrical resistance of cervical mucus and radioimmunoassay determination of progesterone in milk. Electrical resistance was determined every 2 days for 30 days, while standing estrus was investigated every 2 days and rectal palpation performed every week. Progesterone levels began to increase 6-7 days after the onset of estrus in 15 cycling cows, and were maintained between levels of 8.1-10 ng/ml milk on Days 10-17 of the cycle. Variations in milk progesterone were affected by individual differences and the day of the estrous cycle. Although the patterns of electrical resistance were similar over the course of a cycle, there were considerable variations among individuals. Levels of milk progesterone and the degree of cervical mucus electrical resistance correlated by a factor of .22. 4 animals with follicular cysts had random, fluctuating concentrations of progesterone with a mean of 2.6 ng/ml. However, the mean resistance of vaginal mucus was 44 ohms for both cycling and cystic cows. 1 cow was diagnosed as pregnant upon detection of high levels of milk progesterone on Days 19-25 and rectal palpation 3 weeks later. Estrus was not observed in 28% of the cases when measurement of milk progesterone and rectal palpation indicated the animals were in the follicular phase of the estrous cycle.

Cited by 5 articles

34

Effects of pregnant human, nonpregnant human, and fetal bovine sera on human chorionic gonadotropin, estradiol, and progesterone release by cultured human trophoblast cells

M C Henson [1], W Shi, S J Greene, B C Reggio

Affiliations
PMID: 8612549   DOI: 10.1210/endo.137.5.8612549

Abstract

Explant and cell culture methodologies are frequently employed in the investigation of the mechanisms that mediate placental hormone production. Recent reports suggest the presence of unknown regulatory factors in maternal serum that may impact significantly on the regulation of these biosynthetic pathways. The present study, therefore, determined the effects of sera obtained from pregnant women in the second to third trimester (PWS), nonpregnant women (NPWS), and men (MS) as well as commercially prepared FBS on hCG, estradiol, and progesterone release into medium by cultured human trophoblast cells. Placental villous tissue was enzymatically dispersed, and cytotrophoblast cells were purified via density gradient centrifugation and cultured (37 C; 90% air-10% CO_2) in DMEM with 10% PWS, NPWS, MS, or FBS. All cytotrophoblast cultures aggregated and progressed to syncytial forms, although cells cultured with PWS exhibited notably larger multinucleated syncytial elements by 48 h in culture than cells cultured with FBS. Significant increases ($P < 0.05$) occurred in hCG, estradiol, and progesterone release due to the progression of cytotrophoblasts into the syncytiotrophoblast phase in all cultures. The quantity of hCG release was unaffected by serum origin. Cells cultured with human serum released greater ($P < 0.05$) amounts of estradiol than cells cultured with FBS. Cells cultured with MS released more ($P < 0.01$) estradiol than cells cultured with either PWS or NPWS, in a ratio to the concentration of endogenous androgen precursor available. Progesterone release was greater ($P < 0.01$) for PWS-cultured cells than for FBS-cultured cells. Progesterone release by NPWS- and MS-cultured cells was intermediate. Syncytiotrophoblasts cultured with PWS released approximately 3-fold more ($P < 0.01$) progesterone than syncytiotrophoblasts cultured with FBS and low density lipoprotein cholesterol, although the concentrations of available cholesterol substrate were similar. Culture of cells in steroid-depleted or lipoprotein-depleted PWS or FBS resulted in similar decreases ($P < 0.01$) in estradiol and progesterone release, respectively. In summary, increased estradiol release by placental cells cultured in intact human serum was attributed to aromatizable androgens, whereas enhanced progesterone release by cells cultured in human serum could be only partially attributed to higher concentrations of low density lipoprotein cholesterol substrate in human serum. Evidence of increased syncytial maturity and progesterone release by PWS-cultured cells may indicate the presence of undefined serum-borne regulators, which is enhanced during pregnancy.

Cited by 4 articles

35

The relationship between cow's milk and stores of vitamin D and iron in early childhood

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Affiliations
PMID: 23248224   DOI: 10.1542/peds.2012-1793

Abstract

Objective: To examine the association between cow's milk intake on both vitamin D and iron stores in healthy urban preschoolers.

Methods: Healthy children 2 to 5 years of age were recruited from December 2008 through December 2010 through the TARGet Kids! practice-based research network. Cow's milk intake was measured by parental report. Vitamin D and iron stores were measured by using serum 25-hydroxyvitamin D and ferritin. Bivariate multivariable linear regression was used to examine the effect of cow's milk intake simultaneously on 25-hydroxyvitamin D and serum ferritin. Analyses were stratified by important clinical variables including skin pigmentation, bottle feeding, vitamin D supplementation, and season.

Results: Among 1311 children, increasing cow's milk consumption was associated with decreasing serum ferritin (P < .0001) and increasing 25-hydroxyvitamin D (P ≤ .0001). Two cups (500 mL) of cow's milk per day maintained 25-hydroxyvitamin D >75 nmol/L with minimal negative effect on serum ferritin for most children. Children with darker skin pigmentation not receiving vitamin D supplementation during the winter required 3 to 4 cups of cow's milk per day to maintain 25-hydroxyvitamin D >75 nmol/L. Cow's milk intake among children using a bottle did not increase 25-hydroxyvitamin D and resulted in more dramatic decreases in serum ferritin.

Conclusions: There is a trade-off between increasing 25-hydroxyvitamin D and decreasing serum ferritin with increasing milk intake. Two cups of cow's milk per day appears sufficient to maintain healthy vitamin D and iron stores for most children. Wintertime vitamin D supplementation was particularly important among children with darker skin pigmentation.

Comment in

Nutrition: drinking cow's milk alters vitamin D and iron stores in young children.
Greenhill C.
Nat Rev Endocrinol. 2013 Mar;9(3):126. doi: 10.1038/nrendo.2013.1. Epub 2013 Jan 15.
PMID: 23318232 No abstract available.

Cited by 19 articles

36

Effects of increased supplementation of n-3 fatty acids to transition dairy cows on performance and fatty acid profile in plasma, adipose tissue, and milk fat

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Affiliations
PMID: 21094761   DOI: 10.3168/jds.2010-3427

Abstract

The objective of this study was to determine the effects of feeding an increased amount of extruded flaxseed with high proportions of n-3 fatty acids (FA) to transition dairy cows on performance, energy balance, and FA composition in plasma, adipose tissue, and milk fat. Multiparous Israeli-Holstein dry cows (n = 44) at 256 d of pregnancy were assigned to 2 treatments: (1) control cows were fed prepartum a dry-cow diet and postpartum a lactating-cow diet that consisted of 5.8% ether extracts; and (2) extruded flaxseed (EF) cows were supplemented prepartum with 1 kg of extruded flaxseed (7.9% dry matter)/cow per d, and postpartum were fed a diet containing 9.2% of the same supplement. The EF supplement was fed until 100 d in milk. On average, each pre- and postpartum EF cow consumed 160.9 and 376.2g of C18:3n-3/d, respectively. Postpartum dry matter intake was 3.8% higher in the EF cows. Milk production was 6.4% higher and fat content was 0.4% U lower in the EF group than in the controls, with no differences in fat and protein yields. Energy balance in the EF cows was more positive than in the controls; however, no differences were observed in concentrations of nonesterified fatty acids and glucose in plasma. Compared with controls, EF cows had greater proportions of C18:3n-3 in plasma and adipose tissue. The proportion of n-3 FA in milk fat was 3.7-fold higher in the EF cows, and the n-6:n-3 ratio was decreased from 8.3 in controls to 2.3 in the EF cows. Within-group tests revealed that the C18:3n-3 content in milk fat in the EF cows was negatively correlated with milk fat percentage (r = -0.91) and yield (r = -0.89). However, no decrease in de novo synthesis of less than 16-carbon FA was found in the EF group, whereas C16:0 yields were markedly decreased. It appears that the enrichment of C18:3n-3 in milk fat was limited to approximately 2%, and the potential for increasing this n-3 FA in milk is higher for cows with lower milk fat contents. In conclusion, feeding increased amounts of C18:3n-3 during the transition period enhanced dry matter intake postpartum, increased milk production, decreased milk fat content, and improved energy balance. Increased amounts of EF considerably influenced the FA profile of plasma, adipose tissue, and milk fat. However, the extent of C18:3n-3 enrichment in milk fat was limited and was negatively correlated with milk fat content and yield.

Cited by 6 articles

37

Influences on progesterone concentration in bovine milk

J A Pennington, S L Spahr, J R Lodge

Abstract

Factors affecting progesterone concentrations in milk of lactating dairy cows were studied and discussed as they pertained to pregnancy diagnosis. Adding a preservative to milk allowed storage at room temperature for 10 days with no effect on progesterone analysis. Progesterone content in first, composite, and last milk was associated with fat content, although correlation between progesterone concentration in composite milk and fat percentage was low. Variation was considerable in individual samples for each of the milk fractions. Day of the estrous cycle was the most important factor affecting progesterone concentration in milk from cycling cows. Samples for pregnancy diagnosis by milk progesterone should be collected near the time that nonpregnant cows are expected to return to estrus. Progesterone concentration in milk from pregnant cows remained high throughout gestation with progesterone concentrations similar to those in the luteal phase of the estrous cycle.

38

Effect of grass dry matter intake and fat supplementation on progesterone metabolism in lactating dairy cows

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Affiliations

Abstract

Progesterone (P4) metabolism in dairy cattle can be manipulated by alterations in dry matter intake and diet composition. Our objectives were to determine the effects of grazing allowance and fat supplementation on P4 metabolism in lactating dairy cows. Forty mid- to late-lactation Holstein-Friesian dairy cows were used in a completely randomized block design, with a 2 × 2 factorial arrangement of treatments. Cows were assigned to receive 1 of 2 pasture allowances (ad libitum allowance [AL], 9.5 kg dry matter per day, or restricted allowance [R] 7 kg dry matter per day) and 1 of 2 fat supplementation treatments (750 g per day saturated fat [F] or no fat supplement [NF]). All cows received an additional 4 kg per day of concentrate. Grass dry matter intake (GDMI) was measured 5 wk after the initiation of dietary treatment. Cows were treated with prostaglandin F(2α) (PGF(2α)) to eliminate the endogenous source of P4, and two intravaginal progesterone-releasing devices (CIDR) were inserted into each cow for a period of 8 days. Regular blood samples were taken before and after the removal of the intravaginal progesterone-releasing devices, and analyzed for P4 concentrations. The half-life (t½) and metabolic clearance rate (MCR) of P4 was calculated for each cow. There was no effect of GDMI or fat supplementation on the t½ or MCR of P4. There was a tendency for an interaction between GDMI and fat supplementation on the t½ of P4; cows on the restricted-F diet tended to have a longer P4 t½ than cows on the ad libitum-F diet. It was concluded that greater alterations in GDMI than achieved in the current study are required to change P4 metabolism. A combination of fat supplementation and restricted feeding slows P4 clearance, which may have beneficial implications for fertility.

Cited by 1 article

39

Serum antibodies to the major proteins found in cow's milk of Iranian patients with Type 1 diabetes mellitus

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Affiliations
PMID: 15244098

Abstract

The purpose of this study was to assess the humoral immune response to cow's milk proteins in Iranian children with Type 1 diabetes mellitus (T1DM). Eighty children aged 4-17 yr with T1DM from two centres in Iran (the Iranian Association of Diabetes in Tehran and Center for Diabetes Research in Hamedan), 37 apparently healthy siblings of diabetic patients (related controls), 82 apparently healthy age- and sex- matched controls (unrelated controls), and 32 patients aged 11-15 yr with auto-immune thyroiditis were examined for specific whole antibodies (Igs), IgG, and IgM to the major proteins found in cow's milk or to ovo-albumin by enzyme-linked immunosorbent assay (ELISA). A crude extract was made from 2.5% fat pasteurized cow's milk. This extract, together with individual commercial major proteins of cow's milk, was then used as antigen to evaluate the humoral immune response of the subjects to the individual proteins found in cow's milk or to cow's milk as a whole. A questionnaire on medical history, duration of exclusive and non-exclusive breast-feeding and daily intake of dairy products was completed before blood sampling. Diabetic children had significantly higher serum levels of Igs, IgG and IgM to the proteins found in cow's milk than unrelated healthy controls (p<0.001). Healthy siblings of diabetic patients, compared to unrelated controls, had significantly higher levels of serum Igs and IgG to cow's milk proteins (p<0.05 and p<0.01, respectively). Serum levels of Igs and IgG to the cow's milk proteins showed a significantly negative correlation with duration of non-exclusive breast-feeding but positive correlation with daily intake of dairy products. These correlations were stronger when calculated just within the T1DM group. In this group, serum levels of IgM to cow's milk proteins also showed a positive correlation with daily intake of dairy products. Though serum levels of IgG to casein were insignificantly higher in diabetic children than in healthy controls, there was a significant negative correlation between serum levels of IgG to casein and duration of non-exclusive breast-feeding. Again in the T1DM group, this correlation was stronger. There was no significant difference in serum levels of Igs, IgG or IgM to other major proteins of cow's milk or to ovo-albumin between groups. It was concluded that though high levels of Igs or IgG were found to cow's milk

proteins, especially casein, it seems unrelated to the early introduction of cow's milk into an infant diet and the onset of T1DM in Iranian subjects.

Cited by 1 article

40

J Dairy Sci. 2010 Jun;93(6):2533-40. doi: 10.3168/jds.2009-2947.

Estrone and 17beta-estradiol concentrations in pasteurized-homogenized milk and commercial dairy products

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Affiliations
PMID: 20494161   DOI: 10.3168/jds.2009-2947

Abstract

Some individuals fear that estrogens in dairy products may stimulate growth of estrogen-sensitive cancers in humans. The presence of estrone (E(1)) and 17beta-estradiol (E(2)) in raw whole cow's milk has been demonstrated. The objectives of this study were to determine if pasteurization-homogenization affects E(2) concentration in milk and to quantify E(1) and E(2) concentrations in commercially available dairy products. The effects of pasteurization-homogenization were tested by collecting fresh raw milk, followed by pasteurization and homogenization at 1 of 2 homogenization pressures. All treated milks were tested for milk fat globule size, percentages of milk fat and solids, and E(2) concentrations. Estrone and E(2) were quantified from organic or conventional skim, 1%, 2%, and whole milks, as well as half-and-half, cream, and butter samples. Estrone and E(2) were quantified by RIA after organic solvent extractions and chromatography. Pasteurization-homogenization reduced fat globule size, but did not significantly affect E(2), milk fat, or milk solids concentrations. Estrone concentrations averaged 2.9, 4.2, 5.7, 7.9, 20.4, 54.1 pg/mL, and 118.9 pg/g in skim, 1%, 2%, and whole milks, half-and-half, cream, and butter samples, respectively. 17Beta-estradiol concentrations averaged 0.4, 0.6, 0.9, 1.1, 1.9, 6.0 pg/mL, and 15.8 pg/g in skim, 1%, 2%, whole milks, half-and-half, cream, and butter samples, respectively. The amount of fat in milk significantly affected E(1) and E(2) concentrations in milk. Organic and conventional dairy products did not have substantially different concentrations of E(1) and E(2). Compared with information cited in the literature, concentrations of E(1) and E(2) in bovine milk are small relative to endogenous production rates of E(1) and E(2) in humans.

Cited by 17 articles

41

Comparative Study   J Dairy Sci. 1985 Oct;68(10):2740-5. doi: 10.3168/jds.S0022-0302(85)81160-7.

Comparison of pregnancy diagnosis by milk progesterone on day 21 and day 24 postbreeding: field study in dairy cattle

J A Pennington, L H Schultz, W F Hoffman

PMID: 4067040   DOI: 10.3168/jds.S0022-0302(85)81160-7

Abstract

Milk samples collected at 21 and 24 d after breeding were used to diagnose cows as pregnant, questionable, or not pregnant with high, intermediate, or low progesterone in the milk. Total agreement of pregnancy diagnosis in cows by milk progesterone at 21 d postbreeding and diagnosis by return to estrus or palpation of reproductive organs was 85.8% (77.4% on pregnant progesterone diagnosis and 97.2% on not

pregnant progesterone diagnosis). Total agreement of diagnosis by progesterone at 24 d postbreeding and diagnosis by estrus or palpation was 88.4% (83.5% on pregnant progesterone diagnosis and 95.3% on not pregnant progesterone diagnosis). Although total accuracy of cows diagnosed both pregnant and not pregnant by milk progesterone on d 24 postbreeding was greater than diagnosis on d 21 postbreeding when cows in estrus by d 24 were deleted from the data, other comparisons for effect of day on accuracy of diagnosis were not different. Total accuracy of diagnosis on d 24 was not increased by using milk progesterone on both d 21 and 24. Samples collected on the day of breeding indicated that 18 of 960 (1.9%) had intermediate or high progesterone. Fourteen (1.5%) additional cows had progesterone above levels expected for a cow in estrus.

Cited by 3 articles

42

Is cow's milk harmful to a child's health?

Carlo Agostoni [1], Dominique Turck

Affiliations
PMID: 21921812   DOI: 10.1097/MPG.0b013e318235b23e

Abstract

Discussions and debates have recently emerged on the potential positive and negative effects of cow's milk in the paediatric community, also under the pressure of public opinion. The negative effects of cow's-milk consumption seem to be limited to iron status up to 9 to 12 months; then no negative effects are observed, provided that cow's milk, up to a maximum daily intake of 500 mL, is adequately complemented with iron-enriched foods. Lactose intolerance can be easily managed and up to 250 mL/day of milk can be consumed. Allergy to cow's-milk proteins is usually transient. Atopic children may independently be at risk for poor growth, and the contribution of dairy nutrients to their diet should be considered. The connection of cow's milk to autistic spectrum disorders is lacking, and even a cause-effect relation with type 1 diabetes mellitus has not been established because many factors may concur. Although it is true that cow's milk stimulates insulin-like growth factor-1 and may affect linear growth, association with chronic degenerative, noncommunicable diseases has not been established. Finally, fat-reduced milk, if needed, should be considered after 24 to 36 months. Cow's milk represents a major source of high nutritional quality protein as well as of calcium. Moreover, it has growth-promoting effects independent of specific compounds. Its protein and fat composition, together with the micronutrient content, is suggestive of a functional food, whose positive effects are emphasised by regular consumption, particularly under conditions of diets poor in some limiting nutrients, although in industrialised countries cow's milk's optimal daily intake should be around 500 mL, adequately complemented with other relevant nutrients.

Cited by 11 articles

43

Cow's milk and goat's milk

Dominique Turck [1]

Affiliations
PMID: 24029787   DOI: 10.1159/000351485

Abstract

Cow's milk is increasingly suggested to play a role in the development of chronic degenerative, non-communicable disorders whereas goat's milk is advocated as having several health benefits. Cow's milk is a rich and cheap source of protein and calcium, and a valuable food for bone health. Despite their high content in saturated fats, consumption of full-fat dairy products does not seem to cause significant changes in

cardiovascular disease risk variables. Early introduction of cow's milk is a strong negative determinant of iron status. Unmodified cow's milk does not meet nutritional requirements of infants although it is acceptable to add small volumes of cow's milk to complementary foods. Cow's milk protein allergy has a prevalence ranging from 2 to 7%, and the age of recovery is usually around 2-3 years. The evidence linking cow's milk intake to a later risk of type 1 diabetes or chronic degenerative, non-communicable disorders (obesity, metabolic syndrome, type 2 diabetes, hypertension) is not convincing. Milk probably protects against colorectal cancer, diets high in calcium are a probable cause of prostate cancer, and there is limited evidence suggesting that high consumption of milk and dairy products increases the risk for prostate cancer. There is no evidence to support the use of a cow's milk-free diet as a primary treatment for individuals with autistic spectrum disorders. Unmodified goat's milk is not suitable for infants because of the high protein and minerals content and of a low folate content. Goat's milk has no clear nutritional advantage over cow's milk and is not less allergenic. The European Food Safety Authority recently stated that proteins from goat's milk can be suitable as a protein source for infant and follow-on formula, provided the final product complies with the compositional criteria laid down in Directive 2006/141/EC.

Cited by 8 articles

44

Development of in-house RIA kit for progesterone in cow's skim milk

Aldjia Benabdelaziz [1], Samia Boudjemai [1], Rachid Khelili [1], Mohamed Besbaci [2], Rachid Kaidi [2]

Affiliations
PMID: 31885329   DOI: 10.1080/15321819.2019.1708386

Abstract

A radioimmunoassay (RIA) method for progesterone has been developed. It has been validated for the determination of progesterone in cow skim milk. The main reagents used in the development work were prepared and characterized in-house. The assay uses a radioiodinated tracer purified by gel filtration on Sephadex G-25, standards prepared in skim milk and coated tubes with specific antibodies as the solid phase (separation system). The radiochemical purity of the tracer was greater than 95%, the maximum binding using solid phase reached 43% and the nonspecific binding didn't exceed 5%. Series of progesterone standards using milk matrix with concentration ranging from 0 to 40ng/mL were prepared. Detection limit of the assay was 0.13ng/mL and the precision evaluation gives an intra and inter-assay coefficient variations between 4.94% and 12.66%. The recovery obtained with skim milk samples was 84% to 119% and the parallelism test indicated good linearity ($R^2 > 0.99$). The clinical tests give high correlation coefficient (r = 0.998) between progesterone concentrations of cow's skim milk assayed using developed progesterone RIA kit and commercial progesterone **RIA** kit.

Keywords: In-house kit; RIA; cow skim milk; progesterone.

Cited by 1 article

45

Effects of long-term, near-term, and real-time energy balance, and blood progesterone concentrations, on the pregnancy rate of contemporary dairy cows

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Affiliations
PMID: 29310847   DOI: 10.1016/j.anireprosci.2018.01.001

Abstract

This study aimed to contribute to understanding the interface between reproductive and nutritional energetic physiology in contemporary dairy cattle. Multiparous Holstein cows (n = 32) between 70 and 180 days in milk were used in a study starting 10 d prior to the artificial insemination (AI) date and were estrous synchronized using a hormonal regimen. Fourteen cows were determined pregnant on day 39 post-AI. Coccygeal blood samples of all cows were collected on d -10 and -3 prior to AI to determine estrous cyclicity, as well as at AI and at 6, 13 and 20 d post-AI. Milk progesterone was measured 20 d post-AI, and body condition was scored (BCS; 1-5 scale) on days -10, 0, 13 and 27 relative to AI. Blood non-esterified fatty acid concentrations, measured on the same days as BCS, and changes of BCS from d -10 to AI were not predictive of pregnancy outcome. The BCS of cows on the day of AI was greater (P = 0.02) for pregnant cows with an approximate minimum BCS for a high probability of conception being 2.50. Serum progesterone concentrations of pregnant cows were greater (P < 0.05) on days 6, 13 and 20 post-AI, as was milk progesterone at day 20 post-AI (P < 0.01). Pregnant cows had greater (P = 0.02) net energy output (NE_L), which is inconsistent with a common belief that low pregnancy rates in contemporary dairy cows are due to excessive milk production, but is consistent with published studies in this study area. The present research indicates that current low pregnancy rates in commercial high-producing multiparous dairy cattle may be partly due to breeding cows that have insufficient BCS to support pregnancy.

Keywords: Body condition score; Breeding; Energy balance; Progesterone; Reproduction.

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46

Reduced fertility associated with low progesterone postbreeding and increased milk urea nitrogen in lactating cows

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Affiliations
PMID: 9241591　DOI: 10.3168/jds.S0022-0302(97)76058-2

Abstract

The primary objectives of this study were to determine whether a delay in the onset of the luteal phase, or high milk urea nitrogen at breeding, or both were associated with failure of pregnancy early in gestation. Milk samples were collected twice daily from cows in a single herd during the week following breeding; single samples were collected on d 14 and 21 postbreeding. Progesterone was measured in all samples, and a total of 156 sample sets was used. The progesterone data combined with results from pregnancy examinations were used to distribute the cows into three groups: 1) pregnant, 2) nonpregnant with a low concentration (< 2 ng/ml) of progesterone on d 21, and 3) nonpregnant with a high concentration (> or = 2 ng/ml) of progesterone on d 21. The interestrous interval for cows in group 3 was longer than that for cows in group 2. Beginning 4.5 d after breeding, pregnant cows had higher concentrations of progesterone than did cows in group 3. Pregnant cows also had higher concentrations of progesterone than did all open cows on d 14 and 21. The onset of the luteal phase was earlier in pregnant cows than it was in cows in group 3. Milk urea nitrogen at breeding was similar in pregnant cows and in cows in group 3, but was higher in cows in group 2. Increased milk urea nitrogen was also statistically associated with decreased fertility. We propose that the cows in group 3 likely had embryos that initiated pregnancy recognition and prolonged luteal function, but these embryos were compromised by suboptimal exposure to progesterone early in development.

Cited by 4 articles

47

Ovarian characteristics, serum concentrations of progesterone and estradiol, and fertility in lactating dairy cows in response to equine chorionic gonadotropin

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Affiliations
PMID: 23131466   DOI: 10.1016/j.theriogenology.2012.09.017

Abstract

We hypothesized that administration of eCG during the proestrous maturation phase of the preovulatory ovarian follicle would increase follicle size and serum estradiol concentrations. Our objectives were to evaluate the effects of eCG administration on preovulatory ovarian follicle size and growth rate, serum concentrations of estradiol and progesterone, estrual activity, posttreatment luteal activity, and pregnancy per AI. Lactating Holstein cows milked thrice daily were enrolled in a Presynch-Ovsynch timed AI program before the first AI. Cows (N = 128) in a single herd were given two doses of prostaglandin F(2α) (PGF(2α)) 14 days apart (Presynch), with the second dose 11 days before the onset of an Ovsynch protocol (treatment with GnRH 7 days before and 56 hours after PGF(2α), with AI 16 to 18 hours after the second GnRH treatment). Cows were assigned randomly to receive either saline or 400 IU eCG concurrent with PGF(2α) treatment of the Ovsynch protocol (Day 0). Serum concentrations of progesterone and estradiol were assessed to determine if eCG would increase estrual activity, improve ovulatory response to GnRH, and enhance postovulatory luteal function. Compared with controls, treatment with eCG did not increase diameter or growth rate of the largest follicle during 48 hours after eCG, but tended (P = 0.09) to increase growth rate of the second largest follicle. Serum estradiol concentrations and estrual activity were not altered by eCG. Serum progesterone concentrations did not differ between treatments on Days 0, 2, 4, 9, or 16 after eCG treatment. Number of CL per cow on Days 9 and 16 after administration of eCG did not differ between treatments, but total luteal tissue volume tended (P = 0.06) to be greater on Day 16 for eCG-treated cows compared with controls. Pregnancy per AI at first service was similar between eCG (35.3%) and control cows (39.0%). We concluded that eCG treatment administered 3 days before insemination at the dose of 400 IU failed to increase follicle growth size and growth rate 48 hours after treatment, and did not enhance pregnancy outcomes in dairy cattle programmed for AI at first service.

Cited by 1 article

48

Bayesian estimation of sensitivity and specificity of a milk pregnancy-associated glycoprotein-based ELISA and of transrectal ultrasonographic exam for diagnosis of pregnancy at 28-45 days following breeding in dairy cows

Simon Dufour [1], Jean Durocher [2], Jocelyn Dubuc [3], Nandini Dendukuri [4], Shereen Hassan [2], Sébastien Buczinski [3]

Affiliations
PMID: 28460745   DOI: 10.1016/j.prevetmed.2017.03.008

Abstract

Using a milk sample for pregnancy diagnosis in dairy cattle is extremely convenient due to the low technical inputs required for collection of biological materials. Determining accuracy of a novel pregnancy diagnostic test that relies on a milk sample is, however, difficult since no gold standard test is available for comparison. The objective of the current study was to estimate diagnostic accuracy of the milk PAG-based ELISA and of transrectal ultrasonographic (TUS) exam for determining pregnancy status of individual dairy cows using a methodology suited for test validation in the absence of gold standard. Secondary objectives were to evaluate whether test accuracy varies with cow's characteristics and to identify the optimal ELISA optical density threshold for PAG test interpretation. Cows (n=519) from 18 commercial dairies tested with both TUS and PAG between 28 and 45days following breeding were included in the study. Other covariates (number of days since breeding, parity, and daily milk production) hypothesized to affect TUS or PAG test accuracy were measured. A Bayesian hierarchical latent class model (LCM) methodology assuming conditional independence between tests was used to obtain estimates of tests' sensitivities (Se) and specificities (Sp), to evaluate impact of covariates on these, and to compute misclassification costs across a range of ELISA thresholds. Very little disagreement was observed between tests with only 23 cows yielding discordant results. Using the LCM model with non-informative priors for tests accuracy

parameters, median (95% credibility intervals [CI]) TUS Se and Sp estimates of 0.96 (0.91, 1.00) and 0.99 (0.97, 1.0) were obtained. For the PAG test, median (95% CI) Se of 0.99 (0.98, 1.00) and Sp of 0.95 (0.89, 1.0) were observed. The impact of adjusting for conditional dependence between tests was negligible. Test accuracy of the PAG test varied slightly by parity number. When assuming false negative to false positive costs ratio≥3:1, the optimal ELISA optical density threshold allowing minimization of misclassification costs was 0.25. In conclusion, both TUS and PAG showed excellent accuracy for pregnancy diagnosis in dairy cows. When using the PAG test, a threshold of 0.25 could be used for test interpretation.

Keywords: Bayesian estimation; Dairy cattle; Diagnostic accuracy; Latent class models; Pregnancy-associated glycoprotein; Sensitivity and specificity.

Cited by 3 articles

49

Relationships among early postpartum luteal activity, parity, and insemination outcomes based on in-line milk progesterone profiles in Canadian Holstein cows

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Affiliations
PMID: 28708531   DOI: 10.1016/j.theriogenology.2017.05.021

Abstract

The objectives of this retrospective study were to use in-line milk progesterone (mP4) data to investigate relationships of (1) commencement of luteal activity (CLA), and (2) luteal phase (LP) length and frequency preceding first postpartum AI, with parity and AI outcomes in Canadian Holstein cows. Starting 21 ± 1 days postpartum (DPP), levels of mP4 were assessed every 2.2 ± 2.0 d through an automated in-line milk analysis system (Herd Navigator™, DeLaval International, Tumba, Sweden) until ~55 d after first or second AI in 748 Holstein cows from two herds. The CLA was defined as the DPP of the first of at least two consecutive samples with mP4 ≥5 ng/mL, and the period with elevated mP4 (≥5 ng/mL) was defined as the LP. Cows were categorized by CLA [earlier (≤) or later (>) than 28, 35, 42, 49, 56, and 63 DPP], and by the pattern of LP frequency preceding first AI as having or not: (1) one or more normal LP (LP length ≥7 and ≤19 d); (2) one or more abnormal LP (LP length <7 or >19 d, or interluteal period ≥12 d); and (3) two or more LP (either normal or abnormal). Outcomes of first or second AI were determined by the interval between AI and cessation of the ensuing LP as: non-pregnant (mP4-decline ≤30 d), presumed-pregnant (no mP4-decline until 55 d), or presumed-pregnancy loss (mP4-decline between 31 and ≤55 d). The odds of pregnancy per AI (P/AI) at 55 d and pregnancy loss were evaluated using generalized linear mixed models. Primiparous cows had lower odds of having CLA ≤28 DPP [Odds ratio (OR) = 0.58, P = 0.002] and one or more abnormal LP (OR = 0.73, P = 0.04) than multiparous cows. In multiparous cows, CLA ≤28 DPP decreased pregnancy loss (OR = 0.48, P = 0.05) and CLA ≤56 DPP increased P/AI (OR = 4.69, P < 0.01) compared to a later CLA. Primiparous and multiparous cows that had one or more normal LP before first AI had increased P/AI (OR = 3.85 and 3.45, respectively, P < 0.01) and reduced pregnancy loss (OR = 0.26 and 0.27, respectively, P < 0.01) than cows without a normal LP. Primiparous cows that had one or more abnormal LP had decreased P/AI (OR = 0.62, P = 0.04) and increased pregnancy loss (OR = 1.64, P = 0.04) compared to those without an abnormal LP. In summary, AI outcomes were improved in multiparous cows that had early CLA and in cows of both parity groups that had at least one normal LP before first AI. However, primiparous cows that had at least one abnormal LP had reduced AI outcomes. Relationships between early postpartum luteal activity and AI outcomes were inconsistent between primiparous and multiparous cows.

Keywords: Anestrus; Dairy; Estrous cycle; Fertility; Luteal phase; Ovarian activity.

Cited by 1 article

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The Effect of Processing and Seasonality on the Iodine and Selenium Concentration of Cow's Milk Produced in Northern Ireland (NI): Implications for Population Dietary Intake

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Affiliations
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Free PMC article

Abstract

Cow's milk is the most important dietary source of iodine in the UK and Ireland, and also contributes to dietary selenium intakes. The aim of this study was to investigate the effect of season, milk fat class (whole; semi-skimmed; skimmed) and pasteurisation on iodine and selenium concentrations in Northern Ireland (NI) milk, and to estimate the contribution of this milk to consumer iodine and selenium intakes. Milk samples (unpasteurised, whole, semi-skimmed and skimmed) were collected weekly from two large NI creameries between May 2013 and April 2014 and were analysed by inductively coupled plasma-mass spectrometry (ICP-MS). Using milk consumption data from the National Diet and Nutrition Survey (NDNS) Rolling Programme, the contribution of milk (at iodine and selenium concentrations measured in the present study) to UK dietary intakes was estimated. The mean ± standard deviation (SD) iodine concentration of milk was 475.9 ± 63.5 µg/kg and the mean selenium concentration of milk was 17.8 ± 2.7 µg/kg. Season had an important determining effect on the iodine, but not the selenium, content of cow's milk, where iodine concentrations were highest in milk produced in spring compared to autumn months (534.3 ± 53.7 vs. 433.6 ± 57.8 µg/kg, respectively; p = 0.001). The measured iodine and selenium concentrations of NI milk were higher than those listed in current UK Food Composition Databases (Food Standards Agency (FSA) (2002); FSA (2015)). The dietary modelling analysis confirmed that milk makes an important contribution to iodine and selenium intakes. This contribution may be higher than previously estimated if iodine and selenium (+25.0 and +1.1 µg/day respectively) concentrations measured in the present study were replicable across the UK at the current level of milk consumption. Iodine intakes were theoretically shown to vary by season concurrent with the seasonal variation in NI milk iodine concentrations. Routine monitoring of milk iodine concentrations is required and efforts should be made to understand reasons for fluctuations in milk iodine concentrations, in order to realise the nutritional impact to consumers.

Keywords: cow's milk; dietary intake; iodine; processing; public health; seasonality; selenium.

Conflict of interest statement

The authors declare no conflict of interest.

Cited by 5 articles　　　58 references　　　2 figures

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Epidermal growth factor concentrations in human milk, cow's milk and cow's milk-based infant formulas

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Affiliations
PMID: 11940387

Abstract

Objective: Because maternal epidermal growth factor (EGF) may be an adaptive response to accelerate growth and maturation in premature infants, we compared the EGF content in fresh cow's milk and cow's milk-based infant formulas with full and preterm mother's milk.

Methods: EGF content of 57 human colostrum from mothers delivering prematurely and at term, 4 different fresh cow's milk and 8 different cow's milk-based infant formulas was determined by radioimmunoassay (RIA).

Results: Human milk from mothers of premature infants had a higher EGF content compared to that from mothers of term infants (28.2 +/- 10.3 nmol/L vs. 17.3 +/- 9.6 nmol/L). EGF content in human milk negatively correlated with gestational age and birth weight of neonates. EGF content in fresh cow's milk (13.8 - 18.2 nmol/L) was similar to that in human term milk. EGF levels in non-hydrolyzed protein formulas were much lower (5.6 - 8.6 nmol/L), and were undetectable in hydrolyzed protein formulas.

Conclusion: The high EGF content in premature milk may represent a maternal compensatory mechanism to accelerate the growth and development of immature infants. Feeding infants with breast milk from their own mother should be advocated since there is lack of EGF in cow's milk-based infant formulas.

Cited by 1 article

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Effects of treatment of anestrous dairy cows with gonadotropin-releasing hormone, prostaglandin, and progesterone

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Affiliations
PMID: 20412908   DOI: 10.3168/jds.2009-2305

Abstract

Cows anestrous at the start of a seasonal breeding period have lesser probability of breeding, lesser conception rates, and a longer interval to conception than cycling herdmates. Historically, treatment included estradiol benzoate, which is no longer available. Consequently, alternative programs are required. Hence, a study was undertaken to assess new treatment regimens for these cows. The presence or absence of a corpus luteum was determined using ultrasonography in cows (n=2,222 from 12 herds) that were not detected in estrus by 9 d before the start of breeding. Cows were then randomly assigned to one of 4 treatments within each herd. Treatments were (1) 100 microg of gonadorelin, followed 7 d later by 500 microg of sodium cloprostenol, followed 54 to 56h later by 100 microg of gonadorelin, followed by fixed-time artificial insemination at 13 to 18h after the final GnRH injection (Ovsynch); (2) as for (1) but with placement of an intravaginal progesterone (P4)-releasing insert between the initial GnRH and PGF(2alpha) (Ovsynch-56+P4); (3) as for (2) but with the final GnRH treatment delayed until 71h after PGF(2alpha) and P4 insert removal with fixed-time artificial insemination 0 to 5h after GnRH treatment and with insemination of those cows detected in estrus before the second GnRH injection (Cosynch-72+P4); and (4) untreated controls (control). Day 0 was defined as the day of the second GnRH injection. Milk samples were collected from 154 and 152 cows from the Ovsynch and Ovsynch-56+P4 treatments, respectively, at d 0, 7, and 14 for P4 concentration determination. This was to test the hypothesis that inclusion of P4 would result in a greater proportion of cows having normal luteal function after treatment in these 2 groups that differed only in the inclusion of P4 in the Ovsynch-56+P4 treatment. All treatments resulted in shorter intervals from first day of breeding to conception compared with the controls. The Ovsynch-56+P4 treatment resulted in start of breeding to conception intervals 3, 6, and 16 d shorter than those of Cosynch-72+P4, Ovsynch, or controls, respectively, and the positive effect of the Ovsynch-56+P4 treatment occurred both in corpus-luteum-positive and in corpus-luteum-negative cows. The Ovsynch-56+P4 treatment resulted in fewer short interestrus intervals than did Ovsynch (i.e., <18 d; 16 vs. 31%) and more cows with elevated (>1 ng/mL) milk P4 concentrations at d 7 (88 vs. 74%) and d 14 (80 vs. 60%). It was concluded that treatment of anestrous cows before the start of breeding resulted in earlier conception than no treatment but had no effect on the final pregnancy rate. The addition of P4 to the Ovsynch program resulted in earlier conception and in more cows with normal subsequent luteal-phase lengths.

Cited by 5 articles

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Uterine, ovarian, and production responses of lactating dairy cows to increasing dietary concentrations of menhaden fish meal

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Affiliations
PMID: 12018420   DOI: 10.3168/jds.S0022-0302(02)74133-7

Abstract

The primary objective was to determine whether the dietary polyunsaturated fatty acids, eicosapentaenoic (EPA, C20:5, n-3) and docosahexaenoic (DHA, C22:6, n-3), present in fish meal (FM) can attenuate uterine secretion of PGF2alpha in response to a challenge with estradiol and oxytocin in lactating dairy cows. Cycling multiparous cows (n = 32) were fed diets containing 0 (OFM), 2.6 (2.6FM), 5.2 (5.2FM), or 7.8% menhaden FM (7.8FM). The diet consisting of 7.8FM also contained fish oil (0.28% of dietary dry matter) to increase intake of EPA and DHA. Average dry matter intake was 24.9 kg/d and unaffected by diet. Combined intakes of EPA and DHA averaged 0, 12.8, 24.1, and 54.0 g/d from the OFM, 2.6FM, 5.2FM, and 7.8FM diets, respectively. At 30 to 34 d after initiation of dietary treatments, cows received an i.m. injection of 100 microg of GnRH followed by i.m. administration of 25 and 15 mg of PGF2alpha after 7 and 8 d, respectively. Synchronous ovulation was induced by an injection of 3000 IU of human chorionic gonadotropin (hCG) given 24 h later on d 9. Subsequent luteal phase increases in plasma progesterone concentrations did not differ (0.88 ng/ml per day). At 15 d after hCG injection, cows were injected with estradiol-17beta (3 mg, i.v.) at 0900 h and oxytocin (100 IU, i.v.) at 1300 h. Plasma PGF2alpha metabolite concentrations after oxytocin injection were reduced in cows fed diets containing FM compared with those fed OFM. Milk production (39.1 kg/d) and concentrations of fat, protein, or urea nitrogen in milk were not affected by diet. Feeding fish meal and fish oil containing eicosapentaenoic acid and docosahexaenoic acid reduced the proportion of n-6 fatty acids and increased that of n-3 fatty acids in milk in a dose-responsive manner.

Cited by 3 articles

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Induction of lactation by two techniques: success rate, milk composition, estrogen and progesterone in serum and milk, and ovarian effects

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PMID: 744808   DOI: 10.3168/jds.S0022-0302(78)83794-1

Abstract

Induction of lactation was attempted in 12 heifers and 12 cows with estradiol benzoate (.011 mg/kg body weight per day) subcutaneous for 10 days or that plus progesterone (.1 mg + .25 mg/kg body weight per day) for 7 days. Milking commenced on day 20 for those treated with the mixture and on day 11 for the others. Lactations were induced (minimum of 4.5 kg of milk/day) in five of six heifers and two of six cows by the mixture and in six of six heifers and three of six cows for estradiol benzoate. Milk production was 44% of herdmates in the 16 induced lactations. Cows on the single treatment had lower production than the other three groups. Ovarian status, cycling, cystic, or static, was affected adversely in 5 of 16 animals induced successfully. Two of the 16, both heifers, carried calves to term following induction. The transition to normal composition of milk was slower for single than double treatment. Lactose increased slowly to normal over the 1st wk of milking while protein decreased slowly. Estrogen and progesterone in milk of induced cows were approximately twice as concentrated as in normal postparturient cows, probably because milk production was halved.

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Effect of Mycobacterium paratuberculosis infection on production, reproduction, and health traits in US Holsteins

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Affiliations
PMID: 17350703   DOI: 10.1016/j.prevetmed.2007.01.011

Abstract

Our objective was to estimate the effect of Mycobacterium paratuberculosis infection on milk, fat, and protein yield deviations, pregnancy rate, lactation somatic cell score, and projected total months in milk (productive life). A serum ELISA and fecal culture for M. paratuberculosis were performed on 4375 Holsteins in 232 DHIA herds throughout the US. Primarily first through third lactation cows (99% of total) were assayed for infection. Trait information (except productive life) was obtained for the lactation concurrent with disease tests. Productive life was total months in milk through a cow's life, which was projected if a cow was still milking. For most analyses, case definition for M. paratuberculosis infection was defined as either an ELISA S/P ratio>or=0.25 or a positive fecal culture for M. paratuberculosis or both. To determine if diagnostic test affected estimates, case definition was redefined to include only cows with ELISA S/P ratios>or=0.25 or only fecal culture-positive cows. Linear models were used to estimate effect of M. paratuberculosis infection on traits. M. paratuberculosis-infected cows (7.89% of cows) produced 303.9 kg less milk/lactation, 11.46 kg less fat/lactation, and 9.49 kg less protein/lactation (P<or=0.003). Infected cows had higher pregnancy rates (1.39%) (P=0.0385) and lower productive life (2.85 months) (P<or=0.0001). M. paratuberculosis infection did not affect somatic cell score. Effect of infection on milk and protein yields was larger in first lactation M. paratuberculosis-positive cows relative to cows that tested positive in later lactations. Fecal culture-positive cows had consistently larger effects on all traits than ELISA-positive cows. M. paratuberculosis infection, and not just clinical Johne's disease, decreases milk, fat, and protein yields, thus increasing the estimated cost of paratuberculosis to the US dairy industry.

Cited by 19 articles

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Evaluation of a molecularly imprinted polymer for determination of steroids in goat milk by matrix solid phase dispersion

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Affiliations
PMID: 24881547   DOI: 10.1016/j.talanta.2014.03.041

Abstract

A molecularly imprinted polymer-matrix solid-phase dispersion methodology for simultaneous determination of five steroids in goat milk samples was proposed. Factors affecting the extraction recovery such as sample/dispersant ratio and washing and elution solvents were investigated. The molecularly imprinted polymer used as dispersant in the matrix solid-phase dispersion procedure showed high affinity to steroids, and the obtained extracts were sufficiently cleaned to be directly analyzed. Analytical separation was performed by micellar electrokinetic chromatography using a capillary electrophoresis system equipped with a diode array detector. A background electrolyte composed of borate buffer (25mM, pH 9.3), sodium dodecyl sulfate (10mM) and acetonitrile (20%) was used. The developed MIP-MSPD methodology was applied for direct determination of testosterone (T), estrone (E1), 17β-estradiol (17β-E2), 17α-ethinylestradiol (EE2) and progesterone (P) in different goat milk samples. Mean recoveries obtained ranged from 81% to 110%, with relative standard deviations (RSD)≤12%. The molecularly imprinted polymer-matrix solid-phase dispersion method is fast, selective, cost-effective and environment-friendly compared with other pretreatment methods used for extraction of steroids in milk.

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Effects of progesterone and human chorionic gonadotrophin administration five days postinsemination on plasma and milk concentrations of progesterone and pregnancy rates of normal and repeat breeder dairy cows

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Affiliations
PMID: 2379109   PMCID: PMC1255660

Abstract

Treatment with a progesterone-releasing intravaginal device between days 5 and 12 after estrus elevated (p less than 0.05) plasma progesterone concentrations between days 6 and 8 in comparison with controls. Treatment with injectable progesterone (200 mg) on days 5, 7, 9 and 11 postestrus did not increase plasma progesterone concentrations over controls. The administration of 1500 IU human chorionic gonadotrophin (hCG) on day 5 after estrus resulted in a sustained increase (p less than 0.01) in plasma progesterone concentrations from day 8 until day 20 when measurements ceased. Pregnancy rates, as a result of artificial insemination (AI) at the pretreatment estrus, in these treatments (n = 12-14 each), were unaffected by any of the treatments and ranged from 57.1 to 75.0% at 45-60 days post-AI. In a field trial, of 36 repeat breeder cows treated with 1500 IU hCG 5.5 days after insemination, 47.2% were pregnant at 60 days, whereas 39.5% of saline-treated controls were diagnosed pregnant. Treatment with hCG significantly (p less than 0.05) increased milk progesterone concentrations over controls on days 14 and 20 after insemination.

Cited by 2 articles   9 references

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Evaluation of human chorionic gonadotropin as a replacement for gonadotropin-releasing hormone in ovulation-synchronization protocols before fixed timed artificial insemination in beef cattle

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Affiliations
PMID: 18539821   DOI: 10.2527/jas.2008-1122

Abstract

Two experiments were conducted during 2 yr to evaluate differences in ovulation potential and fertility in response to GnRH or hCG. In Exp. 1, 46 beef cows were given 100 microg of GnRH or 500, 1,000, 2,000, or 3,000 IU of hCG. Ovulation incidence was not different between GnRH and any of the hCG doses, indicating that ovulatory capacity of at least 500 IU of hCG was equivalent to GnRH. In Exp. 2, beef cows (n = 676) at 6 locations were assigned randomly to a 2 x 3 factorial arrangement of treatments. Main effects were: 1) pre-timed AI (TAI) treatment (GnRH or hCG) and 2) post-TAI treatment (saline, GnRH, or hCG) to initiate resynchronization of ovulation in previously inseminated cattle. Blood samples were collected (d -21 and -10) to determine progesterone concentrations and assess cyclicity. Cattle were treated with a progesterone insert on

d -10 and with 100 microg of GnRH or 1,000 IU of hCG. A PGF(2alpha) injection was given at insert removal on d -3. Cows were inseminated 62 h (d 0) after insert removal. On d 26 after first TAI, cows of unknown pregnancy status were treated with saline, GnRH, or hCG to initiate a CO-Synch protocol. Pregnancy was diagnosed 33 d after first TAI to determine pregnancies per AI (P/AI). Nonpregnant cows at 6 locations in yr 1 and 1 location in yr 2 were given PGF(2alpha) and inseminated 56 h later, concurrent with a GnRH injection. Five weeks later, pregnancy diagnosis was conducted to determine pregnancy loss after first TAI and pregnancy outcome of the second TAI. Injection of pre-TAI hCG reduced (P < 0.001) P/AI compared with GnRH, with a greater reduction in cycling cows. Post-TAI treatments had no negative effect on P/AI resulting from the first TAI. Serum progesterone was greater (P = 0.06) 7 d after pre-TAI hCG than after GnRH and greater (P < 0.05) after post-TAI hCG on d 26 compared with saline 7 d after treatment in association with greater frequency of multiple corpora lutea. Compared with saline, injections of post-TAI GnRH and hCG did not increase second insemination P/AI, and inconsistent results were detected among locations. Use of hCG in lieu of GnRH is contraindicated in a CO-Synch + progesterone insert protocol. Compared with a breeding season having only 1 TAI and longer exposure to cleanup bulls, total breeding season pregnancy rate was reduced by one-third, subsequent calving distribution was altered, and 50% more AI-sired calves were obtained by applying 2 TAI during the breeding season.

Cited by 1 article

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Comparison of radioimmunoassay and gas-liquid chromatography analyses of progesterone concentrations in cow's milk

L C Nuti, B C Wenthworth, H J Karavolas, W J Tyler, O J Ginther

PMID: 1166084   DOI: 10.3181/00379727-149-38917

Abstract

Progesterone concentrations in milk were not significantly different when quantitated by different methods (RIA vs. GLC). There was a significant day effect (P less than 0.05) on milk progesterone level due apparently to gradually decreasing values as pregnancy advanced over days 30, 120 and 210. The means for the percent fat content were different (P less than 0.05) for all comparisons among four times of collection (immediately premilking, milking pool, immediately postmilking, and 3 hr postmilking). For progesterone concentration, the main effect of time and the three-way interaction (time times antiserum times purification method) were significant (P less than 0.005); all other main effects and interactions were not significant. Within each of 4 assay groups (2 antisera times 2 purifications), the concentration of progesterone was greater (P less than 0.05) for the samples which were collected immediately postmilking than for any of the other times of collection. The three-way interaction seemed due primarily to difference in progesterone determinations among the four assay groups in the samples which were taken immediately postmilking. Over all milk samples within each assay group, the percent fat content and the concentration of progesterone were positively correlated (r = 0.71, P less than 0.01).

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Cow's milk and linear growth in industrialized and developing countries

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Affiliations
PMID: 16848703   DOI: 10.1146/annurev.nutr.26.010506.103757

Erratum in

Abstract

The strongest evidence that cow's milk stimulates linear growth comes from observational and intervention studies in developing countries that show considerable effects. Additionally, many observational studies from well-nourished populations also show an association between milk intake and growth. These results suggest that milk has a growth-stimulating effect even in situations where the nutrient intake is adequate. This effect is supported by studies that show milk intake stimulates circulating insulin-like growth factor (IGF)-I, which suggests that at least part of the growth-stimulating effects of milk occur through the stimulation of IGFs. Given that the biological purpose of milk is to support the newborn during a period of high growth velocity, such an effect seems plausible. Adding cow's milk to the diet of stunted children is likely to improve linear growth and thereby reduce morbidity. In well-nourished children, the long-term consequences of an increased consumption of cow's milk, which may lead to higher levels of IGF-I in circulation or an increase in the velocity of linear growth, are likely to be both positive and negative. Based on emerging data that suggest both growth and diet during early life program the IGF axis, the association between milk intake and later health is likely to be complex.

Cited by 53 articles

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A randomized controlled trial on the effect of incomplete milking during the first 5 days in milk on culling hazard and on milk production and composition of dairy cows

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Affiliations
PMID: 29477529   DOI: 10.3168/jds.2017-14021

Abstract

An incomplete milking in early lactation could help limit negative energy balance in dairy cattle, but its potential effects on culling hazard and on milk production and composition throughout the entire lactation are unknown. The objective of this study was to evaluate the effect of an incomplete milking during the first 5 d in milk on culling hazard, milk weight, milk fat and protein concentrations, and energy-corrected milk (ECM) yield during the whole lactation. A randomized controlled trial was conducted in 13 dairy farms near St-Hyacinthe, Quebec, Canada. Approximately 1 mo before expected calving, Holstein multiparous cows calving between December 2013 and March 2015 (n = 846 cow lactations) were randomly assigned to a control or a treatment group. Cows in the control group were milked conventionally, whereas cows in the treatment group were submitted to an incomplete milking protocol (maximum of 10, 12, and 14 L/d of milk was collected on days in milk 1-3, 4, and 5, respectively). All farms were registered on Dairy Herd Improvement Association, which was used to obtain records on culling, monthly milk yield, and milk fat and protein concentrations. In addition, daily milk yield records were available for 6 farms. A Cox proportional hazards model with a herd frailty term was fitted to the data to compare culling hazard among treatment groups. Regarding milk production and composition, 4 linear mixed models with herd as a fixed effect, cow as a random effect, and using an autoregressive covariance structure were used to study the effect of the incomplete milking on (1) milk weight, (2) milk fat concentration, (3) milk protein concentration, and (4) ECM yield. Culling hazard did not differ among treatment groups (hazard ratio = 1.0; 95% CI = 0.82, 1.3). We observed no differences in milk weight, milk fat, or protein concentration among treatment groups between weeks in milk (WIM) 2 and 44 (the studied period). We noted a difference in ECM between treatment groups for WIM 38, with incompletely milked cows producing less milk than conventionally milked cows (-2.7 kg/d; 95% CI = -0.02, -5.2 kg/d), but no differences were found for any of the other WIM. These results suggest that this strategy for controlling the negative energy balance has negligible effect on cow productivity.

Keywords: culling; dairy cattle; incomplete milking; milk production.

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Proliferative effect of whey from cows' milk obtained at two different stages of pregnancy measured in MCF-7 cells

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Affiliations
PMID: 22008464   DOI: 10.1017/S0022029911000689

Abstract

Dietary estrogens may play a role in the etiology of hormone-dependent cancers like breast cancer. Cow's milk contains various endogenous estrogens and feed derived phytoestrogens that potentially contribute to an estrogenic effect of milk in consumers, and therefore we evaluated the effect of milk (whey) in a proliferation assay with estrogen-sensitive MCF-7 human breast cancer cells. Milk samples were obtained from 22 cows representing different stages of pregnancy (first and second half) and whey was produced from the milk. 0·1, 0·25 or 0·5% whey was included in the cell culture medium and after 6 days of treatment cell proliferation was assessed by a colorimetric method with a fluorometer. Whey induced significant ($P < 0.05$) proliferative effects compared with control cells with no added whey at all concentrations tested. There was no difference in the proliferative effect of whey depending on the stage of pregnancy from which the milk was obtained. We did not observe anti-proliferative effects when whey was tested in the presence of 10 pm estradiol in the medium. In conclusion, these results indicate that whey, irrespective of the pregnancy stage from which the milk was obtained induced a significant proliferative response in MCF-7 cells and no anti-proliferative effect, which may be caused, at least in part, by estrogens present in milk. The implications of our findings in relation to for example breast cancer will have to be studied further in other model systems preferentially in vivo.

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Evaluation of a cow-side milk progesterone assay and assessment of the positive predictive value of oestrus diagnosis by dairy farmers in New South Wales

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Affiliations
PMID: 27891592   DOI: 10.1111/avj.12532

Abstract

Objectives: The three objectives of this study were to determine the positive predictive value (PPV) of oestrus diagnosis (heat detection accuracy) by dairy farmers, calculate the diagnostic sensitivity and specificity of the P4 Rapid milk progesterone assay for detecting a corpus luteum and evaluate the economics of using a cow-side milk progesterone assay designed to aid oestrus diagnosis.

Methods: Milk samples were collected from 752 cows diagnosed in oestrus by farm personnel on 14 dairy farms. Samples were tested using the P4 Rapid milk progesterone assay to estimate the PPV of oestrus diagnosis at each farm and a crude pooled mean of PPV of oestrus diagnosis across all farms. A further 156 milk samples were collected from cows with luteal tissue status determined by transrectal ultrasound and tested by the P4 Rapid assay to enable calculation of the sensitivity and specificity of the P4 Rapid assay.

Results: For pooled farm samples, the PPV was 97.0%, with a range between farms of 88.9-100%. Sensitivity of the P4 Rapid milk progesterone assay for detecting a corpus luteum was 90.1% and specificity was 98.7%. Misclassification of oestrus in cows previously identified as pregnant was the most common cause of false-positive oestrus diagnoses by farm personnel.

Conclusion: Routine testing of milk progesterone in all cows diagnosed in oestrus is not economically justified and may even slightly reduce submission rates; conversely, strategic use of cow-side milk progesterone assays can improve herd reproductive performance by facilitating decisions on whether to rebreed cows previously diagnosed as pregnant.

Keywords: dairy cattle; heat detection; oestrus detection; progesterone assay.

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Goat's milk as a substitute for cow's milk in undernourished children: a randomized double-blind clinical trial

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Affiliations
PMID: 8008540

Abstract

Objective: This paper compares the effects of goat's milk and cow's milk on weight gain and fat absorption, in children with overt malnutrition.

Methods: Thirty hospitalized malnourished children aged from 1 to 5 years were included in a randomized double-blind trial. The children were fed either goat or cow's milk with a randomized will defined composition, added with vegetable oil, sugar, vitamins and minerals o achieve 1,000 kcal/liter. Children were offered 100 kcal/kg on the first day, with a regular daily increase in energy intake thereafter that reached 200 kcal/kg per day on the tenth day.

Results: Both groups of children had the same degree of malnutrition on inclusion. The mean weight-for-height Z score was -1.7 in both groups. One death with candidiasis occurred in the goat's milk group. Weight gain was similar in both groups: 8.5 g/kg/day (SE = 1.37) with goat's milk and 7.8 (SE = 1.9) with cow's milk. There was no significant difference in HEM intake: 157 ml/kg/day (SE = 4), vs 162 (SE = 4) for goat and cow's milk, respectively. Fat absorption coefficients on the 15th day of treatment were also similar in both groups.

Conclusion: These results suggest that goat's milk has a nutritional value similar to that of cow's milk and could be used as an alternative to cow's milk for rehabilitating undernourished children.

Cited by 2 articles

65

A new dried milk sampling technique and its application for progesterone detection in cows

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Abstract

A new method for milk sample collection and storage, based on a dried milk sampling technique, is proposed. The method includes application of a whole milk sample to a porous membrane followed by drying. One hundred whole milk samples (dried and liquid) taken on day 21 post insemination were analysed for progesterone by ELISA and results for both dried and liquid samples were well correlated (r=0.911). Milk progesterone ELISA accuracy for pregnancy diagnosis in cows was 87%.

Keywords: Dried samples; ELISA; Pregnancy diagnosis in cows; Progesterone; Whole milk.

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Effect of grazing and fat supplementation on production and reproduction of Holstein cows

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Abstract

The objective of this trial was to investigate the effects of feeding a soybean oil refining by-product (SORB), made up mainly of sodium salts of long-chain fatty acids, on reproductive performance and productivity of 36 early lactation Holstein cows managed in a free-stall barn or on annual rye-ryegrass pasture. In this 2 x 2 factorial arrangement of treatments, cows consumed 0 or 0.5 kg/d of SORB as part of a total mixed ration for barn cows or as part of a grain supplement fed to cows on intensively, rotationally stocked pasture. Blood was sampled 3 times weekly and plasma was measured for progesterone to assess ovarian activity. Estrus activity was recorded using the HeatWatch estrus detection system. Although average 14-wk milk production (37.2 kg/d) was not different among treatments, barn cows had more persistent lactations than did grazing cows. Cows housed in the barn lost less body weight and returned to initial body weight sooner and had lower mean concentrations of plasma nonesterified fatty acids (464 vs. 261 mEq/L) than those managed on pasture. The milk fat of cows on pasture contained greater proportions of conjugated linoleic acid and linolenic acid but a corresponding 0.22 percentage unit decrease in milk fat concentration (3.39 vs. 3.16%). Cows managed on pasture had greater peak concentrations of plasma progesterone during the first estrous cycle. Cows managed on pasture and fed SORB had the greatest accumulation of plasma progesterone over the 14 wk of the study (SORB x housing interaction). These cows experienced the most mounts during their first estrus (9.3) and pregnancy rate was also greatest for this treatment (62.5%). Feeding SORB did not affect production of milk, fat, or protein. Loss of body condition was less in cows fed SORB. Ruminal fluid concentration of propionate increased and ruminal pH decreased in cows fed SORB. A lower proportion of fatty acids less than 18 carbons in length was found in the milk fat of cows fed SORB, thus indicating lower de novo synthesis of fatty acids. Higher proportions of C18:2n-6 and conjugated C18:2 were found in the milk fat of cows fed SORB. Based on concentrations of plasma progesterone, cows fed SORB experienced their first ovulation earlier (26.7 vs. 42.4 d postpartum) than did cows not supplemented with SORB. Neither housing system nor SORB supplementation influenced detection of first estrus (50.5 d) or the mean length of each estrus period (447 min).

Cited by 1 article

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Induction of lactation: comparison of injections of estradiol-17 beta and progesterone for 7 or 21 days on prolactin response to thyrotropin releasing hormone and milk yield in dairy cattle

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Abstract

Subcutaneous injections of estradiol-17 beta and progesterone (.10 and .25 mg/kg of body weight) for 7 (group I) or 21 (II) days were used. Dexamethasone (.028 mg/kg of body weight per day) or adrenocorticotropin (200 IU per day) was injected into cows in each group on days 18 to 20 (I) or 32 to 34 (II). Additionally, 100 mug of thyrotropin releasing hormone was injected intravenously on days 1, 7, 17 (I) or 1, 7, and 31 (II). Milking was initiated on days 21 (I) or 35 (II). Overall 13 of 14 cows had mean daily yields of milk greater than 5 kg; 12 had 305-day lactations. Yields of milk in cows injected for 21 days were greater on day 1 and increased more rapidly until peak was reached at 10 wk; daily mean production throughout lactation was greater (14.3 versus 10.1 kg) than for cows injected for 7 days. Lactation curves pooled within cow within treatment differed. Concentrations of estradiol, estrone and progesterone increased during steroid injections and were 2- to 3-fold higher on

day 21 in II than on day 7 (I or II), but concentrations of prolactin and total glucocorticoids in plasma did not differ during this time. The quantity of prolactin released in response to injection of thyrotropin releasing hormone was greater 10 days after steroid injections than before or during steroid injections. Preinjection concentrations of prolactin were correlated with magnitude of postinjection response to thyrotropin releasing hormone, but response was not correlated with concentrations of steroids in plasma on day of injection.

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Estradiol-17beta and progesterone in ovaries of starfish (Pisaster ochraceous)

C R BOTTICELLI, F L HISAW Jr, H H WOTIZ

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