

台灣參加國際畜政聯盟 導入跨域創新科技改良乳質

ICAR-Taiwan on Cross-Domain Innovative Technology for Milk Quality



Network. Guidelines. Certifications.

- ABOUT US
- TECHNICAL BODIES
- CERTIFICATIONS
- PUBLICATIONS
- GUIDELINES
- MEETINGS

ICAR's core products and services are guidelines, evaluation and certification services, seminars and workshops for:

- ANIMAL IDENTIFICATION
- 6433
- ANIMAL EVALUATION
- ANIMAL DATA MANAGEMENT

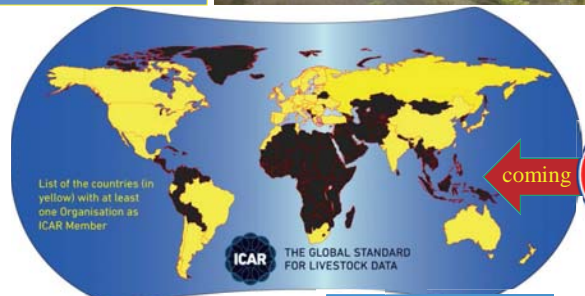
畜產試驗所
吳明哲組長 (Mr. Ming-che Wu)
蕭振文分所長 (Mr. Jen-wen Shiau)

Members of ICAR (International Committee for Animal Recording)

International Non-Governmental Organization (1951 Rome Italy)



2011 (in blue)
Japan
Korea
Taiwan



The International Committee for Animal Recording (ICAR) is composed of 115 Members from 57 countries.

2020 (in yellow)

FarmJournal's MILK

APRIL 10, 2018

Where Will The Dairy Industry Be in 50 Years?

NEWS | BY: JIM DICKRELL

By 2067, the United Nations predicts world population will grow by 3 billion to **10.5 billion** people. Most of these folks will be added in Asia and Africa. Not only will population increase, but dairy consumption will increase even more as incomes rise and the demand for diets higher in protein grows. All totaled, **milk** production will have to grow **13.2 trillion pounds**. For that to happen, the average dairy cow in the world will have to **double its annual milk production**.
(5,987,000,000,000 Kg)



Dairy farmers in 2067 will meet the world's needs for essential nutrients by adopting technologies and practices that provide improved cow health and longevity, profitable dairy farms, and sustainable agriculture. **Integrated sensors, robotics, and automation** will replace much of the manual labor on farms.

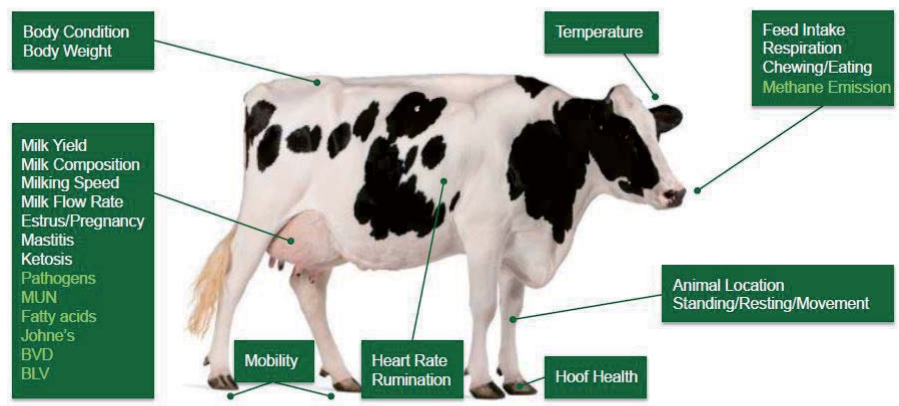


May 2018 Volume 101, Issue 5, Pages 3722-3741

Invited review: Learning from the future—A vision for dairy farms and cows in 2067

J.H. Britton, R.A. Cushman, C.D. Dechow, H. Dobson, P. Humblot, M.F. Hutjens, G.A. Jones, P.S. Ruegg, I.M. Sheldon, J.S. Stevenson

Denmark FARMER OR TECHNOLOGY



ICAR 2018 Auckland, New Zealand February 11, 2018



WHERE WE CAME FROM AND WHERE WE ARE HEADING
Milk recording and data value before and now
Uffe Lauritsen RYK, Denmark



Portfolio of Interbull evaluations

國際種公牛後裔女兒牛性能評估年曆



國際畜政聯盟
乳牛性能分項

1995	Production						
1999	Production	Type					
2001	Production	Type	Cellcount				
2004	Production	Type	Cellcount	Longevity			
2005	Production	Type	Cellcount	Longevity	Calving		
2007	Production	Type	Cellcount	Longevity	Calving	Fertility	
2008	Production	Type	Cellcount	Longevity	Calving	Fertility	Workability

乳量乳質—體型—體細胞數—高繁—產犢順—易懷孕—好擠乳

International information

Cross-reference list

Interbull Cross-reference lists of bulls with multiple registrations

Production 乳量乳質

Evaluation summaries for production traits

Conformation 體型

Evaluation summaries for conformation traits

Udder health 體細胞數

Evaluation summaries for udder health traits

Direct longevity 高繁

Evaluation summaries for direct longevity traits

Calving Traits 產犢順

Evaluation summaries for calving traits

Female Fertility 易懷孕

Evaluation summaries for female fertility traits

Workability 好擠乳

Evaluation summaries for milking speed and temperament

2012

牛乳品質提升研討會

Net-Working on Cow Milk Quality

2012年5月8日(星期二) 行政院農業委員會畜產試驗所技術服務部
台南市新化區牧場路112號

主辦單位：行政院農業委員會畜產試驗所
協辦單位：中華乳業協會
指導單位：行政院農業委員會

2013

-High quality milk smiling-

乳品原料乳品質提升研討會

Empowering Technology for Dairy Industry -

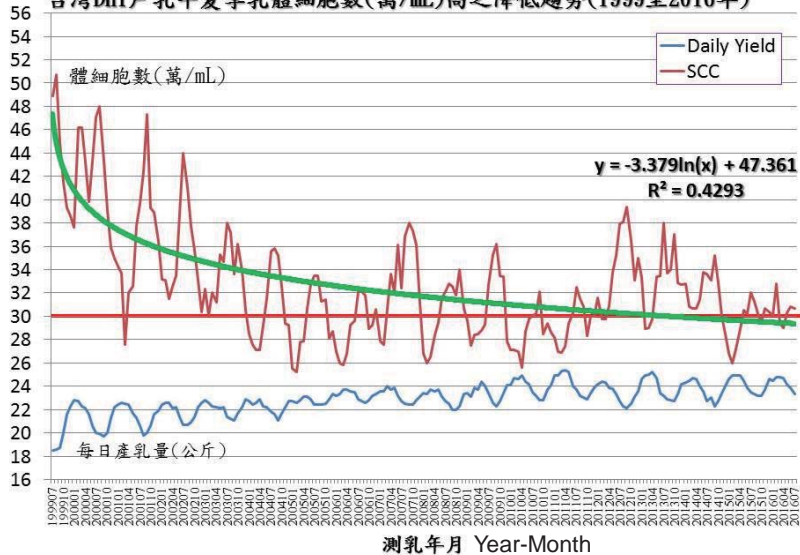
Denmark, Vietnam & Taiwan

2013年7月23日(星期二) 行政院農業委員會畜產試驗所技術服務部
台南市新化區牧場路112號

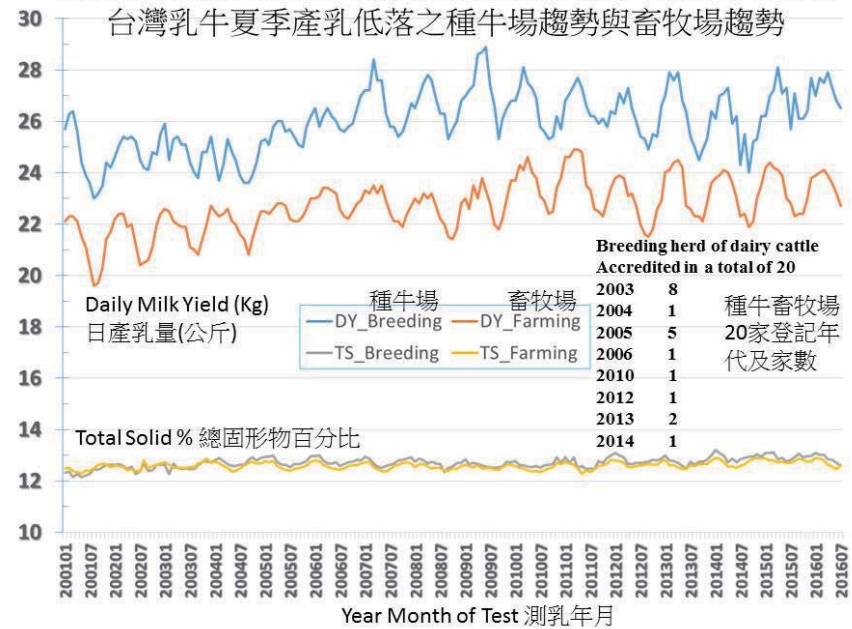
主辦單位：行政院農業委員會畜產試驗所
協辦單位：中華乳業協會
指導單位：行政院農業委員會

Somatic cell counts (10,000/mL) during hot summer season in Taiwan (1999-2016)

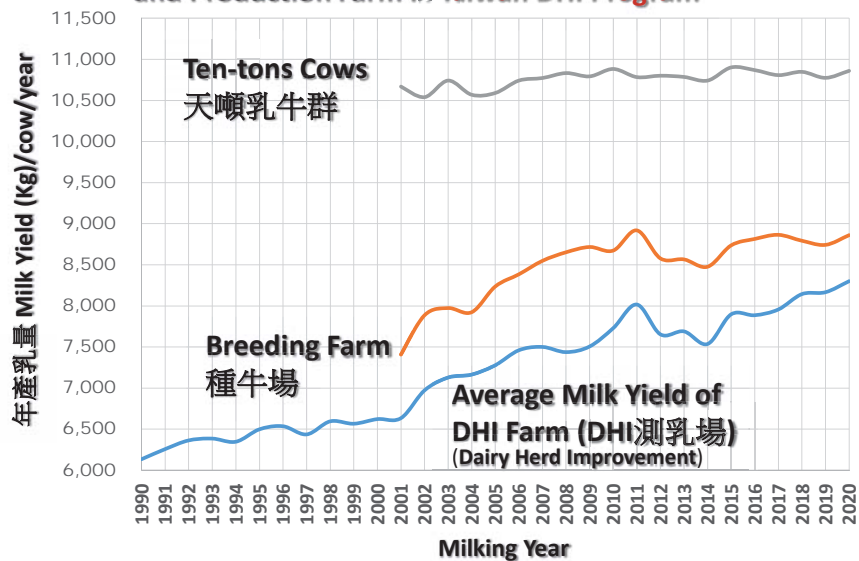
台灣DHI戶乳牛夏季乳體細胞數(萬/mL)高之降低趨勢(1999至2016年)



Summer depression of daily milk yield in dairy cattle of Taiwan
台灣乳牛夏季產乳低落之種牛場趨勢與畜牧場趨勢



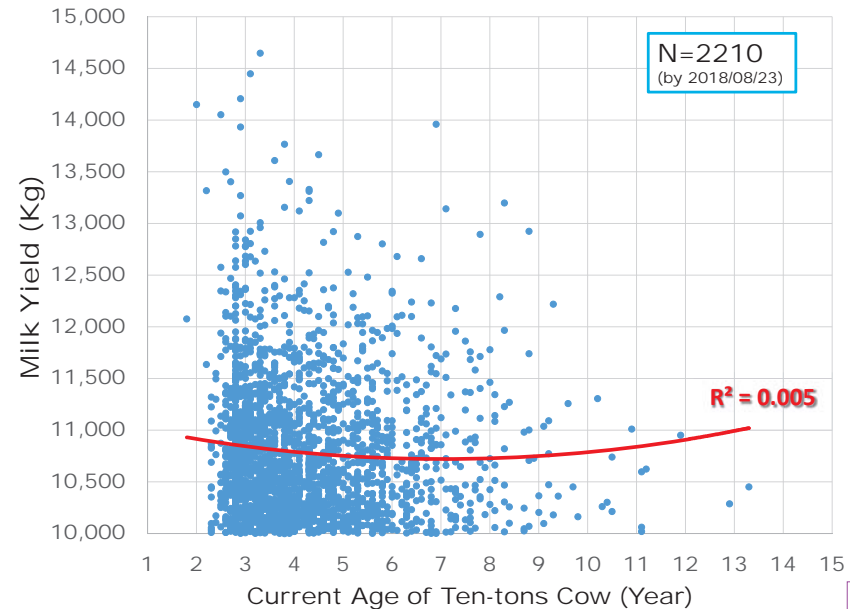
Average Milk Yield of Ten-tons Cows, Breeding Farm and Production Farm in Taiwan DHI Program



2020/08/16 by Mingche WU

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Relationship of Milk Yield and Current Age of Ten-tons Cow in 2018



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菲律賓2016年與2017年的生乳產業規模戶數及其鮮乳自給率

Philippine Dairy Industry 2017

	CY 2016		CY 2017	
Livestock population, heads #	9,139,856		9,161,331	
Total dairy herd, number	55,776		58,023	
Total dams and does, number	27,768		27,889	
Players/Producers				
• Number of farm families	51,110		54,300	
• Number of primary cooperatives and institutions	627		618	
	In million kilograms	In Million Liters or '000MT(LME)	In million kilograms	In Million Liters or '000MT(LME)
Net Supply of Milk Products	445.67	2,582.65	413.97	2,456.71
Local milk production	21.16	21.16	22.76	22.76
Net imports of milk products	424.51	2,560.99	391.21	2,433.95
Exports of milk products	28.48	211.58	25.86	52.34
Total imports	452.99	2,772.57	417.07	2,486.29
Volume of skim milk powder imports	179.03	1,435.85	139.83	1,121.44
Volume of other imports in powder form	103.03	807.28	104.01	814.29
Volume of UHT imports	67.56	65.60	5.69	61.49
Volume of other dairy imports	282.40	463.84	243.50	489.07
% Share of Supply				
Net Supply of Milk Products	100	100	100	100
Local milk production	5	1	5	1
Net imports of milk products	95	99	95	99
Number of dairy processors and importers*	155		185	
Volume of imports accounted for by top three processors*	13%		23%	
Volume of imports supplied by top two country sources	54%		51%	

Basic Sources: PSA- Foreign Trade Statistics 2017, NDA-PMSD Philippine Dairy Update 2017
Note: # - includes cattle, carabao and goats
Livestock population/inventory - 2018- as of Jan 1
NDA-PMESD3/29/18

Note: LME - liquid milk equivalent
MT - metric tons
* - prelim

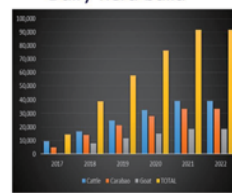
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Dairy Cattle Breeding and Milk Quality Analysis for Young Farmers

proposed by Taiwan Livestock Research Institute

Challenges to the Philippine Dairy Industry

Dairy herd build



- Decreasing calving to conception interval from 7 to 3 months
- Decreasing calving interval from 17 to 14 months and kidding interval from 12 to 8 months
- Increasing breeding success rate
- Increasing dairy animal inventory from 14,548 to 91,456 head through local production and importation
- Importation (live, semen, embryo)

Philippine Council for Agriculture, Aquaculture and Natural Resources Research and Development

➢ **Philippine** is in the process of introducing modern dairy cows and importing **heat-resistant milking cows** to improve domestic milk production and quality.

➢ **Taiwan** has become a model country for **dairy industry** development in tropical climate.

Signing MOU of PCC and TLRI 2015/6/4



2020~2023

Philippine is invited to participate in the **Taiwan leading project of Far-East Asian Dairy Cattle Breeding and Milk Quality Analysis for Young Farmers.**

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Far-East Asia Networking of Dairy Technology Connected with ICAR Guidelines for Young Farmers
24-25 May 2016 Livestock Research Institute

Far-East Asia Networking of Animal Breeding Connected with Climate Change for Young Farmers
23-25 May 2017 Taiwan Livestock Research Institute

2018年9月12日
越南與台灣乳業發展論壇
Dairy Industry Development - Vietnam & Taiwan

行研院與越南農業發展部簽署合作備忘錄

- 越南乳業發展論壇 (Dairy Industry in Vietnam)
- 以國際中區經濟合作乳牛論壇 (DIE Forum & Raw Milk Pricing in Taiwan)
- 越南與台灣乳業發展論壇 (Dairy Industry Development - Vietnam & Taiwan)
- 美國亞拉巴馬州乳牛中區論壇 (AAI) (Alabama Cash & Roundtable Asia)
- 精誠人、個人及中區之乳業發展 (Networks for Dairy Cattle Farmers in Taiwan)
- 越南與台灣乳牛發展論壇 (Forum of Vietnamese-Taiwanese Dairy)

主辦單位 (Sponsored by):
 行研院臺灣畜牧業發展部 (Taiwan Livestock Research Institute, TSA, TRIL)
 中華民國乳業發展協會 (Dairy Association Taiwan, D.A.T.)
 中國國際經濟合作乳牛中區論壇 (AAI, Roundtable Asia, R.A.S.)
 行研院農業發展部 (Department of Agriculture, Forestry & Fisheries, MOE, DAF) (DAF)
 精誠人乳業發展公司 (Whittem Dairy Products Asia Stock Company, Vietnam)

越南與台灣乳業發展論壇
Dairy Industry Development - Vietnam & Taiwan
2018年9月12日 Tainan, Taiwan

Vietnam is in the process of introducing modern dairy cows and importing heat-resistant milking cows to improve domestic milk production and quality.

Taiwan Livestock Research Institute and Department of Livestock Production of the Ministry of Agriculture of Vietnam signed a Memorandum of Understanding (MOU) on May 23, 2017.

Vietnam market volume of US\$2,396m in 2019



Source: Statista, July 2018
<https://www.statista.com/outlook/40010000/127/milk-products/vietnam>

FUTURE FARMING
Robotic Milking
 Jan Hulsen
 Jack Rodenburg

乳牛每日作息

Activity	Percentage
Lying down	45%
Standing and socializing	25%
Eating	16%
Milking	13%
Drinking	1%

生產力4.0應用案例說明—乳牛產業

- 乳牛產業智慧化生產
- 我國乳牛產業是東南亞國家的發展楷模，也是亞洲國家日本、韓國與以色列等國之外，乳業採用機械工程科技最多的國家。
 - 荷蘭與丹麥為減少乳業勞力需求而投入智慧機器人全天候型擠牛乳機台開發多年，並影響到美加紐澳之精準乳業，已促使養乳牛戶應用自動感測系統及採用省時、省工、高效率的自動化器具至為迫切。



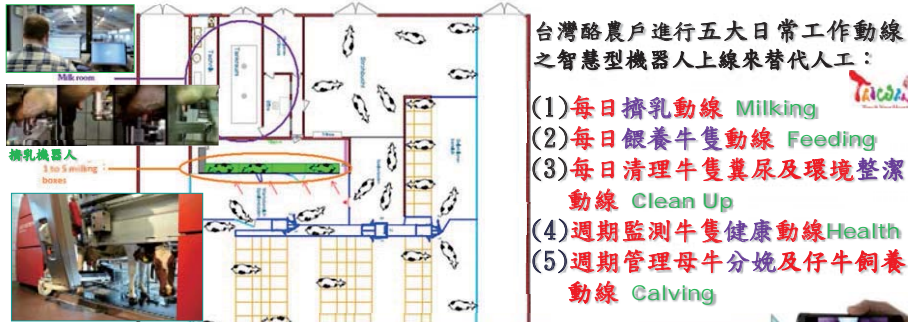
- 效益
1. 可讓養牛戶以智慧機器人取代勞力，由每日6小時減少為2小時，讓養乳牛成為產乳工廠模式的智慧型農業工程。
 2. 納入智慧型感測系統及採用省時、省工、高效率的自動化器具，精準生產提升品質齊齊度由60%提高至90%以上。

智慧農業4.0

生乳產業領航產業技術研發與應用

台灣乳牛場導入五大動線機器人

Robotic Systems for Dairy Cattle Farm in Taiwan



歐美日韓機器人照護乳牛動線 Basic Milking Center Layout



Smart Agriculture 4.0 Program for sustainable dairy farm



乳牛人工授精
目視鏡週期監
測牛隻健康



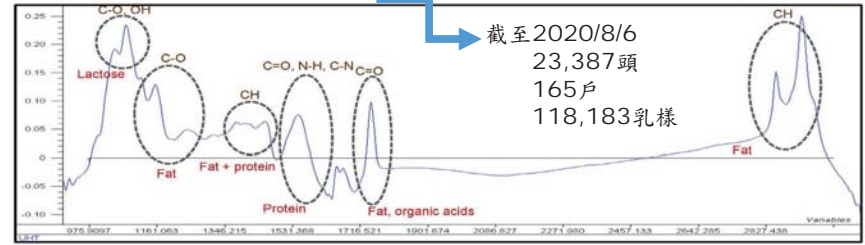
Mingche WU 2018/11/10

<https://www.lely.com/solutions/milking/astronaut-a4/>

傅立葉紅外線光譜法(FTIR)

檢測我國乳牛群DHI乳樣

ICAR & IDF/ISO
CONFERENCE ANALYTICAL WEEK
2019 PRAGUE
CZECH REPUBLIC



• Position of the peaks → Qualitative analysis
• Intensity of the peaks → Quantitative analysis

Watkinson
researcher
CRA-W

Watkinson Agricultural Research Centre
To address today's questions and to prepare tomorrow's challenges
www.cra.watkinson.ie



John Wakelin's 18-year-old dairy cow Vanessa has been classified excellent for a fifth time. 紐西蘭南島這頭乳牛已18歲，第五度獲得“高繁天嘸乳牛獎”



畜產試驗所新竹分所生乳分析實驗室參加ICAR每年3月和9月進行的牛乳乳質分析熟練測試(PT)。

Tru. Prot(S) - True Protein-Full Spectrum Method Prot(T) - Crude Protein-Traditional Filter Method (Taiwan DHI)



說明：

- 真蛋白質是牛乳中的蛋白質，而粗蛋白質可以衡量所有氮源，其中包括非蛋白質氮。例如尿素，對人類沒有食物價值。在製作乳酪和其他製成品時，這種非蛋白質氮是廢物。
- 美國乳牛品種公牛冷精之乳蛋白質率選拔，於2000年8月開始使用true protein 真蛋白質率(TP%)，已滿20年，國際種公牛協會於2008年開始使用真蛋白質率，故台灣進口的冷精均為真蛋白質率選拔。
- 加拿大的牛乳蛋白質支付系統於2018年9月從粗蛋白質率(CP%)更改為真蛋白質率(TP%)系統。

義大利研究經產牛發情排卵前的乳，其乳脂率明顯地升高，可以用 F/P 比值來判斷排卵時刻，這對我國乳牛場使用擠乳機器人的牛群，更可以預測授精時刻。

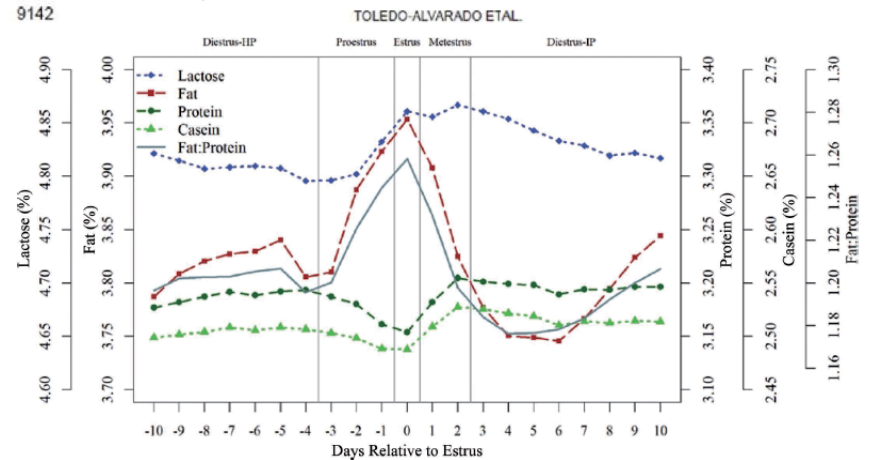


Figure 2. Least squares means of fat (± 0.011 SE), protein (± 0.005 SE), casein (± 0.004 SE), lactose (± 0.003 SE), and fat:protein (± 0.004 SE) ratio for each day nested in the estrous cycle phases. Diestrus high-progesterone (diestrus-HP) ranging from -10 to -4 d (n = 27,574); proestrus ranging from -3 to -1 d (n = 12,302); estrus at d 0 (n = 4,144); metestrus from 1 to 2 d (n = 8,275); and diestrus increasing-progesterone (diestrus-IP) ranging from 3 to 10 d (n = 33,052). Color version available online.

