

# 臺灣DHI系統與生乳計價優勢

## DHI System and Raw Milk Pricing in Taiwan

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越南與台灣乳業發展論壇  
Dairy Industry Development -  
Vietnam and Taiwan  
2018/09/12

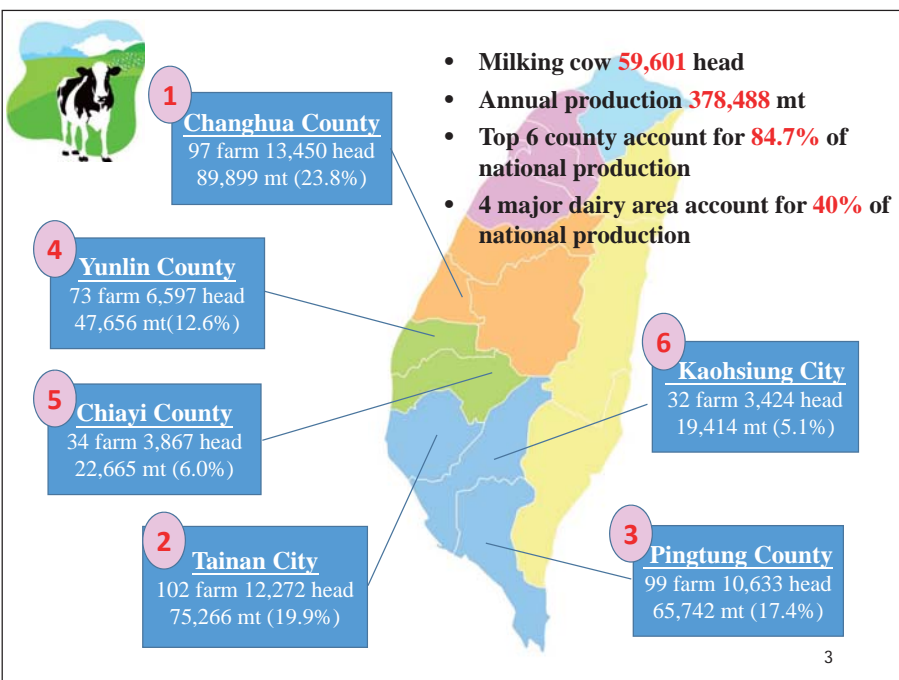


## Statistics of dairy farming in Taiwan

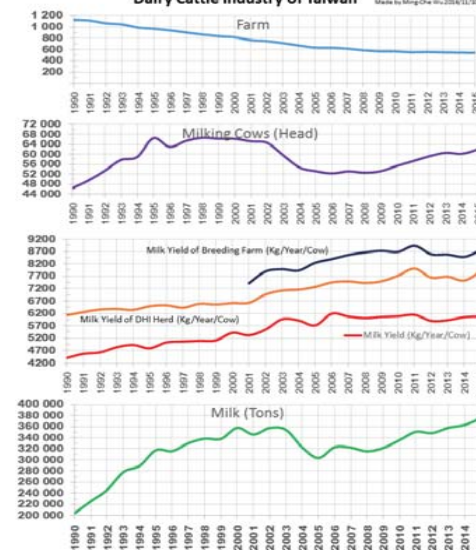
Dairy farms **550**, Cows **110 k**, Milking cows **60 k**  
Cows/farm **204** · Annual raw milk production **378 k mt**  
Output value **330 M(USD)** · **6%** total livestock output value



Year	Farm	Head	Milking cows	Ave milk production (kg/head/y)	Raw milk production (k mt) (%):Class A	Fresh milk production (k mt)	Output value (M USD)
2010	571	102,151	55,296	6,077	336 (88.0%)	273	271
2011	556	105,849	57,196	6,135	351 (86.9%)	293	302
2012	560	109,773	59,145	5,892	348 (83.8%)	299	303
2013	554	110,195	60,500	5,920	358 (81.4%)	307	312
2014	550	110,082	60,103	6,042	363 (80.2%)	308	317
2015	546	112,647	61,859	6,070	375 (85.6%)	318	328
2016	545	110,237	59,601	6,350	378 (89.1%)	321	330



Dairy Cattle Industry of Taiwan



The dairy cattle industry in Taiwan.

(臺灣乳牛牧場數, 乳牛頭數, 種牛場生乳產量及臺灣總生乳產量)



## Dairy consumption/ person/ year consistently growth in Taiwan

Items Year	Dairy (all)	Fresh milk	Milk powder	Other
2009	20.14	15.20	3.25	1.68
2010	20.69	15.97	3.09	1.63
2011	21.51	16.61	3.21	1.69
2012	20.93	16.34	2.96	1.63
2013	21.52	16.50	3.13	1.90
2014	22.39	16.95	3.12	2.31
2015	23.65	17.61	3.29	2.75
2016	24.52	17.98	3.03	3.52

5

## Introduction of DHI

- Dairy farmers over the world, no matter what climatic environment, have a desire to milk better.
- To help achieve this goal, DHI or herd recording, has been developed in countries of the world.
- The individual dairyman obtain information so that he can use for
  - Improving the producing efficiency for his herd.
  - Culling the least profitable cows.
  - Feeding the cows according to their production requirements.
  - Selecting the most suitable animals for breeding up the inherent producing ability in his herd.

It is a kind of dairy record keeping program.

6

## No. of DHI farmers and cows from 2013-2018

Year	Farmers	Heads
2001	<a href="#">287</a>	27,940
2002	<a href="#">315</a>	34,465
2003	<a href="#">348</a>	38,850
2004	<a href="#">345</a>	39,327
2005	<a href="#">327</a>	36,977
2006	<a href="#">296</a>	33,705
2007	<a href="#">280</a>	31,948
2008	<a href="#">260</a>	29,311
2009	<a href="#">212</a>	25,275
2010	<a href="#">209</a>	25,640
2011	<a href="#">197</a>	26,486
2012	<a href="#">187</a>	26,227
2013	<a href="#">170</a>	24,870
2014	<a href="#">167</a>	25,706
2015	<a href="#">176</a>	26,902
2016	<a href="#">179</a>	27,209
2017	<a href="#">185</a>	28,071



(Acquire Date : 2018/8/23)

## Mean milk production (305-2X-ME) of all DHI cows



8

## Dairy Herd Improvement Association (DHIA)

- An organization of dairy farmers who keep records
- In Taiwan, Dairy Association of Taiwan (DAT) conduct DHI. DHI project was initiated in 1977.
- Now, DAT employ the 14 supervisor. The supervisor will determines the production of each cow in the herd and maintains animal identification and other records as required by the DAT rules.
- Operate a center for milk testing and dairy records processing.



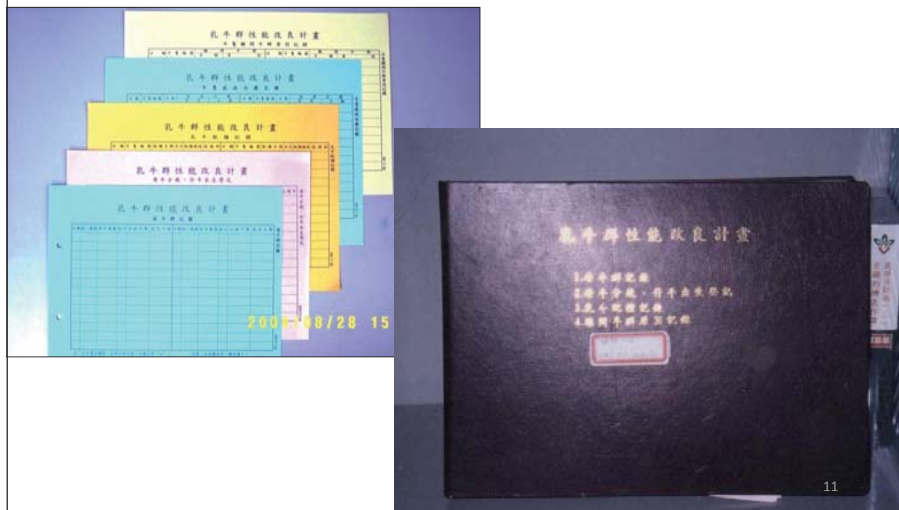
9

## The charge of Sampling and testing

- Farmers pay for the official DHI service at **NT\$63 (2 USD)**/ head (milking cow).
- Herd owner measure milk weights and takes samples by himself **NT\$43(1.4 USD)**/ head.
- Entrusted case at **NT\$500(16.7 USD)**/ sample.
- The samples are shipped to the central laboratory and tested.
- Data are processed in the center and reports are email back or printed out and mail to farmers.

10

## Farmers have to keep all essential data on different color cards in the folder day by day



11

## 2. Outline of Supervisors Work

Visiting Farm once a month work with farmer one day

### Evening Work

1. Arrive at the farm early to avoid causing any delay in the milking.
2. Before evening milking time, filled in all items not completed and prelisted in barn sheets.
3. Eartag all calves that have entered the herd since the last testing day and recorded the identification on appropriate forms.
4. Fill in an updates and change-of-status codes of cows required by the computing center .
5. Weigh the milk of each cow and record weights on the barn sheet.
6. If the milking is done with a bucket milker, mix the milk from each cow thoroughly then take the sample. If a pipeline milker and meter are used, take the sample from the sampling device.
7. Get as much of the required information as possible in the evening.
8. Strive to assist the dairyman by discussing with the breeding, feeding, and management program. Let farmer feel free to obtain assistance and materials from the computing center, and extension specialist.

12





- DHI supervisor visit farm once a month routinely to identify each of cows in the herd and to collect data on the barn sheets
- The cow's ID is frozen branded by liquid nitrogen on the hide

13

## Milk weighing and sampling

- To weigh milk yield and take milk sample from each milking for all individual cows in the herd during 24-hour period in a day
- To write down calving, breeding, drying, culling data of the herd on barn sheet



14

## Outline of Supervisors Work

### Morning Work

1. Again to weigh and take milk sample from each cow as in the last evening milking.
2. Obtain a composite sample of the evening's and morning's milk of each cow for the component and quality test.
3. Greater accuracy is obtained by using proportionate quantities from each milking to collect the composite sample.
4. The composite samples are packed well so as to prevent breakage during the trip to the laboratory.
5. Transfer data from the barn sheet to the individual cow-record forms as farmer needed.
6. Be sure that all entries should be completed from the dairyman's herd-record book.
7. Before leaving the farm, recheck all items on the barn sheet are filled out properly, all individual cow records are brought up to date, and all necessary new identifications have been made.

15

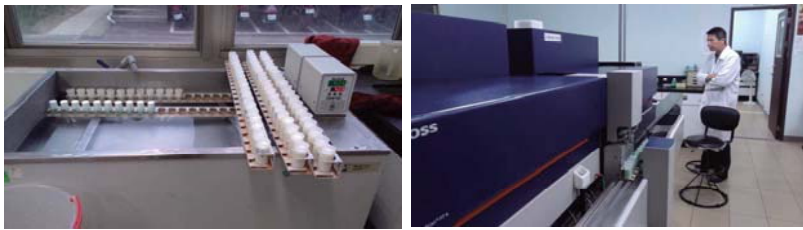
## Sending test day records and milk samples to milk testing Lab



16

### 3. Milk sample testing

- Fat%, protein%, lactose%, and SCC, MUN in milk will be determined by approved procedures and equipment.
- Solids-not-fat (SNF) through calculation (protein%+lactose%+0.7%) .
- Computers capture milk component test results.
- Transmit results to the DRPC.
- Merge with other data collected.



17

### Dairy Records processing Center (DRPC)

- Organizing all collected data.
- Calculating the lactation milk yield totals.
- Standardizing milk yield (305-2X-ME).
  1. number of milking times per day.
  2. length of the lactation.
  3. age of the cow and month of the year at calving.
- Generating reports.



18

### The average milk yield and component in DHI (2006 ~2013)

Year	Daily milk (kg/day)	SCC 10 <sup>3</sup> cells/cc	Fat (%)	Protein (%)	305-2X-ME Milk yield
2006	23.2±0.09	291±1.84	3.74±0.01	3.27±0.01	7,461
2007	23.7±0.09	332±1.74	3.74±0.01	3.21±0.01	7,501
2008	23.0±0.08	301±1.74	3.69±0.01	3.26±0.01	7,439
2009	23.7±0.08	308±1.63	3.68±0.01	3.26±0.01	7,508
2010	24.4±0.09	286±1.63	3.57±0.01	3.28±0.01	7,630
2011	24.1±0.08	292±1.63	3.60±0.01	3.25±0.01	7,685
2012	23.3±0.08	306±1.63	3.72±0.01	3.24±0.01	7,655
2013	24.9±0.08	301±1.63	3.70±0.01	3.26±0.01	7,744

### DHI Reports

Herd #	cows ID	Daily milk yield	Fat %	Protein %	Lactose %	TS %	SCC 10 <sup>4</sup> /cc	MUN mg/cc	Citrus acid mg/cc	Remark
場内編號	統一編號	乳量 (公斤)	乳脂肪率 (%)	蛋白質率 (%)	乳糖率 (%)	總固形物 (%)	體細胞數 (萬個/mL)	尿素氮 (mg/dL)	檸檬酸 (mg/dL)	注意事項
	Cow number	21.00	3.40	3.13	4.07	11.30	191.6	8.10	142.00	(A)
91k1673	10032936	15.00	3.51	3.91	Milk component		61.2	14.10	132.00	(A)
91k5159	10035063	19.00	3.55	2.62	5.02	11.89	53.1	7.40	112.00	(A)
6k2277	10022179	32.00	3.63	2.82	4.45	11.60	25.7	10.90	120.00	(A)
9k1727	10025605	14.00	3.64	3.65	4.60	12.59	49.0	14.50	83.00	
:	:	:	:	:	:	:	:	Pay attention	:	:
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
2	10032992	22.00	2.40	2.80	4.52	10.42	1.2	11.00	129.00	(B)
Statistic data										
統計資料	92頭	21.05	3.52	3.26	4.65	12.54	14.0	13.82	116.70	2

## Summary information

統計分析	當日乳量	體細胞數	乳脂率	蛋白質率
	35公斤以上 0頭	7.1萬以下 53頭	3.00%以下 3頭	3.00%以下 21頭
	25-34公斤 18頭	7.2-56.5萬 37頭	3.01%-3.50% 38頭	3.01%-3.50% 46頭
	15-24公斤 69頭	56.6-113萬 1頭	3.51%-4.00% 30頭	3.51%-4.00% 24頭
	14公斤以下 5頭	113.1萬以上 1頭	4.00%以上 21頭	4.00%以上 1頭

Milk and component frequency

Be careful of (A) mastitis (B) fat (C) mastitis and fat

檢驗說明

- 注意事項代號說明：(A)注意乳房炎，(B)注意乳脂率，(C)注意乳房炎和乳脂率。
- 尿素氮含量正常值為11-17mg，檸檬酸含量正常值為119-190mg。
- \*表示該項目未申請NLA認可。\*The item was not recognized by TAF
- 本件係由委託者自行送樣，所列紀錄僅對樣品負責。本報告所記載事項不得作廣告、出版物及商業推銷之用。  
影本或分離使用無效。

報告簽署人： Signer of report 3

21

## DHI monthly report

乳牛群性能改良 - 性能檢定月報表

資料年月：2018/8 上次採樣：2018/7/16 36843 苗栗縣西湖鄉五湖村埤頭面207-5號  
 站 號：7056西湖二場 本次採樣：2018/8/14 西湖二場 037-911693  
 輔導員：0099康行牧場 樣本間座：29 列印日期：2018/8/17 頁次：1/1

場內編號	前 九 個 月 泌 乳 實 料										配種日期		配種次數		空胎日數	注意事項			
	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量					
3090003	14	0	0	0	0	25	23	28	5	22	3.90	2	18/3/28	3500	3	19/3/17	72		
33F0003	3	0	0	0	0	2	4	4	3	4	4.70	52	130		4	00JEE00791	1		
5080305	0	0	0	0	0	0	0	0	0	23	3.29	1	18/7/21	568	3	油乳大數過少	尚未配種	24	
55F0305	0	0	0	0	0	0	0	0	0	2	3.77	20	24		3	暫不採樣			
總頭數：2											22.6	3.60							
											3	4.23	82						48

牛乳體細胞說明(範圍單位為千個)

分數	範圍	分數	範圍	分數	範圍
0	0-18	3	72-141	6	566-1130
1	19-35	4	142-283	7	1131-2262
2	36-71	5	284-565	8	2263-4523

(A)體細胞數過高(分數6)，請注意帶在性乳房炎  
 (B)乳脂率過低(2.8%)，請注意飼養管理  
 (C)配種日期與配種次數(2.8%)，請注意飼養管理  
 (D)乳量產量低(130kg)，請注意  
 (E)空胎日數過長(空胎日數大於100天)，請注意飼養  
 (F)配種次數過多(配種次數大於4次)，請注意配種

22

## Daily milk yield and SCC for the past 9 months Of all individual cows in the herd

統一編號	前 九 個 月 泌 乳 實 料								
	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量	乳量
場內編號	體細胞	體細胞	體細胞	體細胞	體細胞	體細胞	體細胞	體細胞	體細胞
92160259						25	23	23	23
259	0	0	0	0	0	1	1	1	1
91160296			18	25	23	21	25	21	23
296	0	0	1	0	0	1	2	1	2
:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:
16015031	21	19	19	15	17	15	21	15	19
21	5	6	4	4	5	5	5	4	5
:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:
16014773	15	11	13	13				35	38
8	3	3	2	3	0	0	0	0	0
16014153									
9									
總頭數 67									

1

23

## Reproduction performance for current status of each cow in the herd

305-2X_ME 同期比較		配種資料		空胎日數	注意事項
乳量	乳量	配種日期	配種次數		
7,812	1,464	2004/4/28	002	191	
312	79	H1704	2005/2/4		C
8,015	1,728	2003/12/7	002	116	
312	83	H1704	2004/9/14		C
:	:	:	:	:	:
:	:	:	:	:	:
7,090	825	2004/4/28	011	561	AB
193	-36	H1704	2005/2/4		
:	:	:	:	:	:
:	:	:	:	:	:
7,699	1,184	尚未	配種	93	
273	37				
5,966	(284)	2004/3/1	006	394	
237	9	h1704	2004/12/8		
7,082					
250					3
				123	

24





# Dairy Herd Improvement (DHI)

## 上網型DHI數位報表查詢系統

最近10個月牛群(乳量、體細胞分數資料)體細胞分數查詢系統  
乳(DHI)模擬選配系統

全國各區域平均體細胞分數統計圖

場內各胎次305-2X-ME脂肪量平均公斤統計圖

2012年4月牛乳品質檢驗乳量統計圖

發情牛隻動態即時報表

預定發情牛隻報表

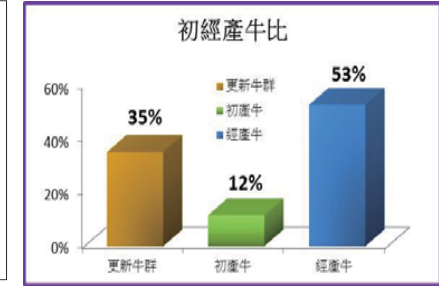
牛隻編號	胎次	配種日期	配種時間	配種地點	配種人員	備註
8474	7520	ETAS	00			
229	287	ETAS	00			
368	294	ETAS	00			
269	371	ETAS	00			
428	422	ETAS	00			

# Herd structure information

## 乳牛群基本資料及分群管理報表

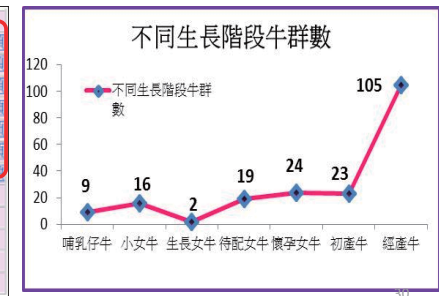
選擇檢驗日期 2012年 4月 查詢

頭次場內編號	統編	出生日期	父親牛精液編號	母親牛精液編號	月齡
選擇查詢範圍	1月出生			37月齡以上產過乳牛	



出生月份	月齡	月齡
1月出生	9頭	2月齡以下哺乳期仔牛 9頭
2月出生	7頭	3月~6月齡小女牛 16頭
3月出生	16頭	7~15月齡生長女牛 2頭
4月出生	13頭	16~18月齡待配女牛 19頭
5月出生	20頭	19~24月齡懷孕女牛 24頭
6月出生	14頭	25~36月齡初產泌乳牛 23頭
7月出生	17頭	37月齡以上經產泌乳牛 105頭
8月出生	22頭	
9月出生	11頭	
10月出生	25頭	
11月出生	19頭	
12月出生	25頭	

重要的摘要統計表  
看出牛群結構端倪



# DHI individual reproductive performance search

請輸入統一編號: 55551348 查詢



統一編號	55551348	基礎登錄編號	
酪農名稱	畜一股	父親牛精液編號	複製牛
場內編號	1348	母親牛統一編號	
品種	荷蘭牛	母親牛場內編號	
出生日期	2004/10/27	日齡	2981



畜一股 統一編號 55551348 牛隻 配種資料表

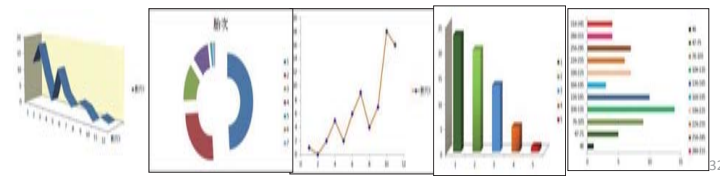
次數	統一編號	配種日期	日齡與上次配種日距	配種精液	登錄日期
1	55551348	2007/7/31	1007	7H5408	2007/8/10
2	55551348	2007/9/12	1050	14H2632	2007/10/4
3	55551348	2007/11/16	1115	7H5366	2007/12/6
4	55551348	2009/5/19	1665	7H8004	2009/6/5

統一編號	分娩日期	日齡與上次分娩日距	乾乳日期	分娩女牛編號	分娩女牛編號1	母牛體重	胎次登錄日期
55551348	2007/5/3	918	2007/10/31			650	1 2007/6/8
55551348	2008/8/26	1399	481	2009/3/30		650	2 2008/9/3
55551348	2010/6/19	2061	662	2010/10/15	55552007		3 2010/7/9

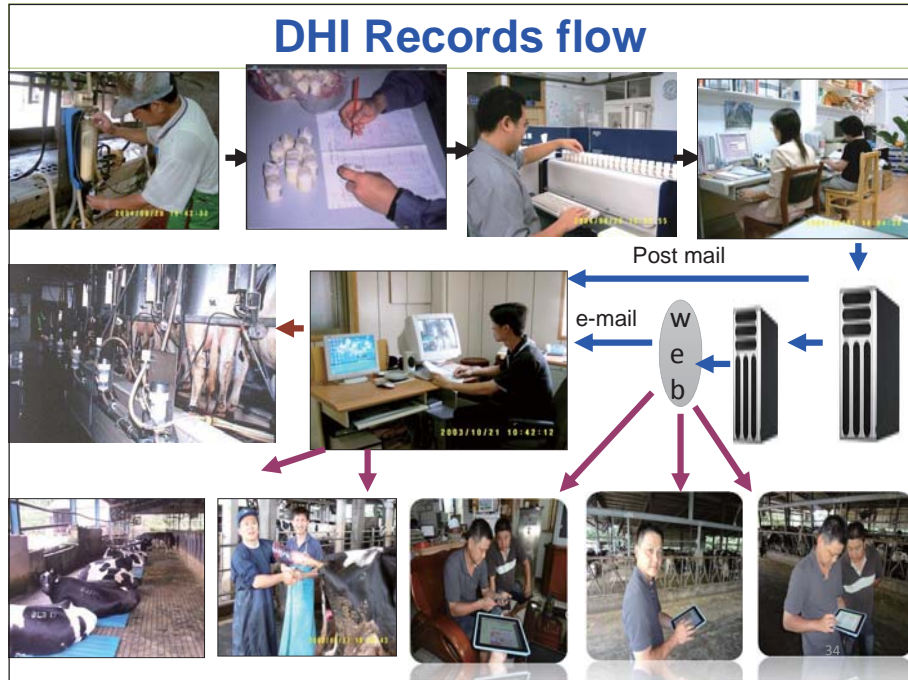
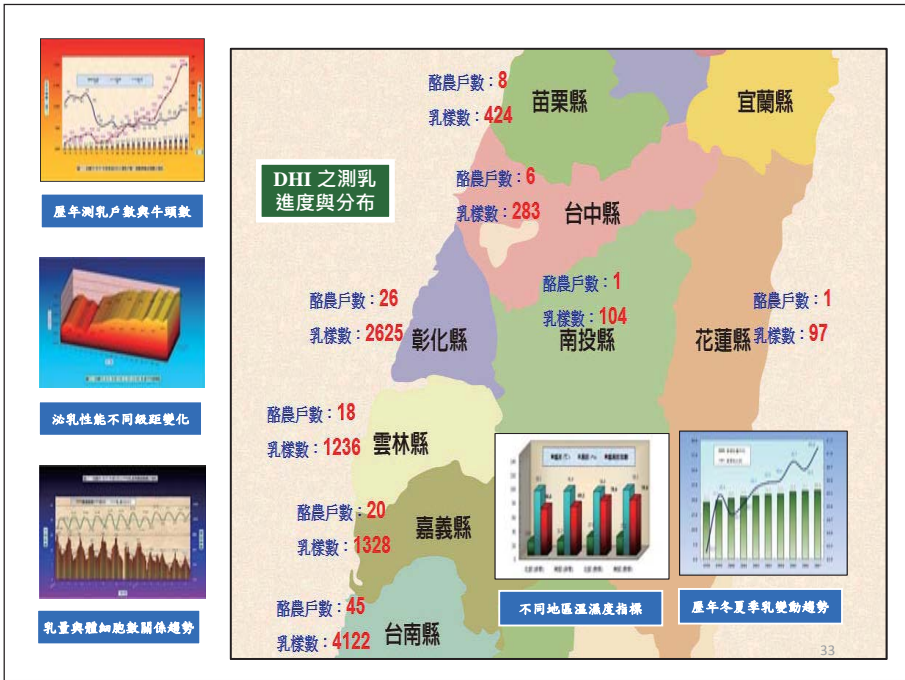
資料來源: 陳志毅、畜產試驗所新竹分所 SBIP 台灣荷蘭乳牛選育網站 (2012/10)

# Reproduction Summary

Calving month	Lactation	Days in milk	Breeding times	Days open
分娩月份	胎次	泌乳天數	配種次數	空胎天數
1月分娩 12頭	第1胎 34頭	46天以下 1頭	1次 23頭	46天以下 1頭
2月分娩 18頭	第2胎 18頭	47-75天 0頭	2次 20頭	47-75天 5頭
3月分娩 9頭	第3胎 9頭	76-105天 2頭	3次 13頭	76-105天 9頭
4月分娩 2頭	第4胎 7頭	106-135天 5頭	4次 5頭	106-135天 14頭
5月分娩 12頭	第5胎 1頭	136-165天 2頭	5次 1頭	136-165天 10頭
6月分娩 5頭	第6胎 0頭	166-195天 6頭	6次 0頭	166-195天 3頭
7月分娩 2頭	第7胎 1頭	196-225天 9頭	7次 0頭	196-225天 7頭
8月分娩 4頭	第8胎以上 0頭	226-255天 4頭	8次以上 0頭	226-255天 6頭
9月分娩 3頭		256-285天 7頭		256-285天 7頭
10月分娩 0頭		286-305天 18頭		286-305天 4頭
11月分娩 2頭		306天以上 16頭		306天以上 4頭
12月分娩 1頭				







### Milk Pricing in Taiwan (from 2014)

SNF%	8.00-8.16			8.17-8.32			8.33-8.48			8.49-8.64			8.65-8.80			8.81-8.99			9.00-9.17			9.18以上		
	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9	12-3	4-5 10-11	6-9
2.8	16.25	21.12	23.12	16.35	21.24	23.24	16.45	21.35	23.35	16.55	21.47	23.47	16.66	21.58	23.58	16.76	21.70	23.70	16.87	21.81	23.81	16.97	21.93	23.93
2.9	18.05	23.12	25.12	18.15	23.24	25.24	18.25	23.35	25.35	18.35	23.47	25.47	18.46	23.58	25.58	18.56	23.70	25.70	18.67	23.81	25.81	18.77	23.93	25.93
3.0	19.85	25.12	27.12	19.95	25.24	27.24	20.05	25.35	27.35	20.15	25.47	27.47	20.26	25.58	27.58	20.36	25.70	27.70	20.47	25.81	27.81	20.57	25.93	27.93
3.1	20.21	25.52	27.52	20.31	25.64	27.64	20.41	25.75	27.75	20.51	25.87	27.87	20.62	25.98	27.98	20.72	26.10	28.10	20.83	26.21	28.21	20.93	26.33	28.33
3.2	20.93	26.32	28.32	21.03	26.44	28.44	21.13	26.55	28.55	21.23	26.67	28.67	21.34	26.78	28.78	21.44	26.90	28.90	21.55	27.01	29.01	21.65	27.13	29.13
3.3	21.18	26.61	28.61	21.33	26.78	28.78	21.49	26.95	28.95	21.64	27.12	29.12	21.80	27.28	29.28	21.95	27.45	29.45	22.11	27.61	29.61	22.26	27.78	29.78
3.4	21.43	26.90	28.90	21.64	27.12	29.12	21.84	27.34	29.34	22.05	27.56	29.56	22.25	27.77	29.77	22.46	27.99	29.99	22.66	28.20	30.20	22.87	28.42	30.42
3.5	21.61	27.09	29.09	21.82	27.31	29.31	22.02	27.53	29.53	22.23	27.75	29.75	22.43	27.96	29.96	22.64	28.18	30.18	22.84	28.39	30.39	23.05	28.61	30.61
3.6	21.79	27.28	29.28	22.00	27.50	29.50	22.20	27.72	29.72	22.41	27.94	29.94	22.61	28.15	30.15	22.82	28.37	30.37	23.02	28.58	30.58	23.23	28.80	30.80
3.7	21.97	27.47	29.47	22.18	27.69	29.69	22.38	27.91	29.91	22.59	28.13	30.13	22.79	28.34	30.34	23.00	28.56	30.56	23.20	28.77	30.77	23.41	28.99	30.99
3.8	22.15	27.66	29.66	22.36	27.88	29.88	22.56	28.10	30.10	22.77	28.32	30.32	22.97	28.53	30.53	23.18	28.75	30.75	23.38	28.96	30.96	23.59	29.18	31.18
3.9	22.33	27.85	29.85	22.54	28.07	30.07	22.74	28.29	30.29	22.95	28.51	30.51	23.15	28.72	30.72	23.36	28.94	30.94	23.56	29.15	31.15	23.77	29.37	31.37
4.0	22.51	28.04	30.04	22.72	28.26	30.26	22.92	28.48	30.48	23.13	28.70	30.70	23.33	28.91	30.91	23.54	29.13	31.13	23.74	29.34	31.34	23.95	29.56	31.56

Grade	SCC (k/cc)	Bacteria count (k/cc)
A	Below 300	Below 100
B	300-500	Below 100
C	500-800	Below 100
D	800-1000	Below 100

Source: National Animal Industry Foundation (NAIF)

### 2018 ICAR Proficiency Tests

Items	No. of lab participated in PT	Ave Z score	Ranking	%of ranking	ICAR result
Fat	25	0.00	11	44	Good
Protein	26	0.00	3	12	Good
Lactose	27	-0.58	15	56	Good
Urea	17	1.22	13	76	Good
BHB	19	-0.36	5	26	Good
SCC	38	0.14	8	21	Good
PAG	11				

定性：5個試驗樣本皆檢測正確，無排名

## Using genomic selection to improved performance of dairy cattle

(應用基因選種來改善乳牛表現)

- The study conducted genomic test on 506 head of Holstein cattle by using GeneSeek Prime 50K SNP chip. (應用50K SNP單一核苷酸多態性晶片進行506頭乳牛基因檢測)
- The genetic evaluation included (1) health-yield-fertility traits, (2) type traits, (3) genetic conditions, and (4) parentage validation. (基因評估包括(1)健康-產量-繁殖性能(2)體型性狀(3)遺傳條件(4)親子鑑定)

Sampling



GeneSeek Prime 50K SNP chip

Reports

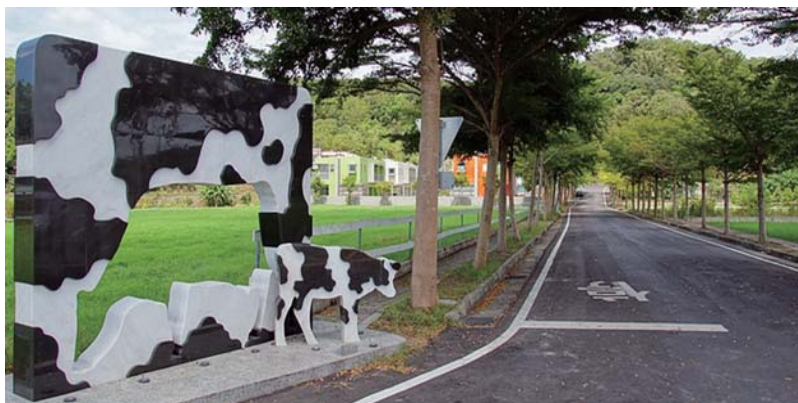
Farm ID	NMS	NMS Report Rank	Genomic REL %	NM S US Percent Rank	KEY TRAITS												
					Milk Yield	Fat (lbs)	Pro (lbs)	SCS	PL	DPR	DCE	GM\$	IPI	PTA Type	GFI		
1501	488	1	67	97	1838	74	56	3.04	1.6	-1	5.3	465	2051	2.46	2.5		
1502	361	2	69	86	201	44	18	2.73	2.2	-0.2	6.5	264	1798	1.58	5.9		
1503	243	3	68	63	759	37	21	2.88	0.7	-1	7.8	218	1728	1.7	6		
1504	217	4	68	57	686	23	22	3.02	1	1.1	6.8	164	1654	1.04	2.3		
1505	62	5	70	21	236	52	13	3.3	-1.9	-0.9	6	49	1451	0.63	73.4		

## Conclusions

- DHI program will still be an important project for dairy farmers in Taiwan.
- DHI program provide important information for dairy farmers in decision making in their management strategy.
- The milk laboratory will continuously participating in ICAR proficiency tests to upgrade its testing ability and maintain the ability of QC laboratories in milk factories in Taiwan.
- The future tasks in DHI program will be extended its service to such as PAG testing, genomic testing etc.
- Milk pricing currently is in favor of dairy farmer due to strong demand for raw milk and the milk factory are willing to offer better price and longer contracts to receive raw milk.
- A lot of factors affected the milk pricing and the development of milk price needed to be monitoring carefully in the future.

38

## Thank you for your attention



39