

丹麥與臺灣乳牛場使用機器人科技研討會
Smart Dairy Farming with Robots: Denmark & Taiwan

乳牛群餵養飼料時程安排與 勞動力需求

Needs on Farming Labour and Feeding
Schedule Arrangement in Dairy Cattle Herds

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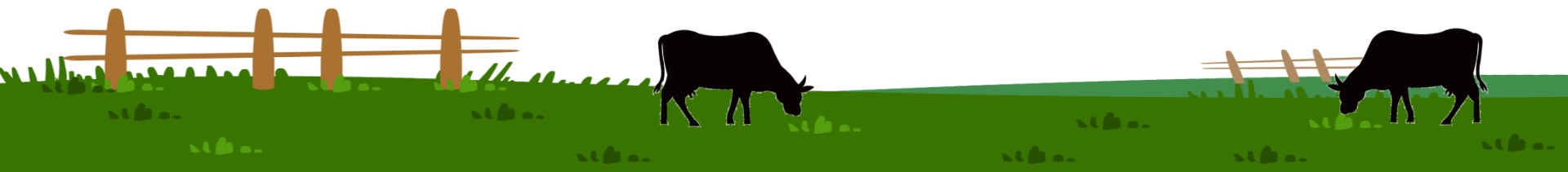
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2020.10.06



子議題A大綱 Outline of Part A

- 臺灣擠乳作業 Milking procedure
- 臺灣畜舍清潔 Barn cleaning
- 臺灣廢水處理 Waste disposal
- 省工方案 Reduce working hours
- 小結 Conclusion





臺灣擠乳作業

MILKING PROCEDURE



臺灣擠乳作業 Milking procedure



乳房清潔

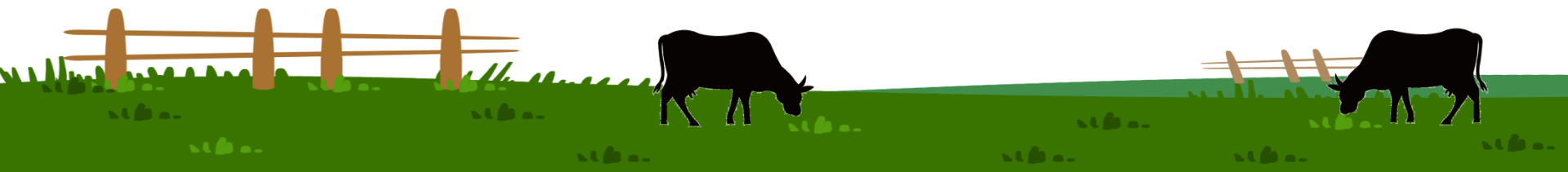
前藥浴

擠前乳

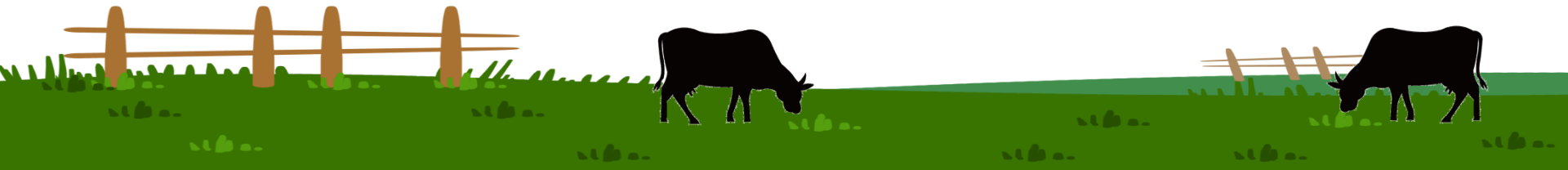
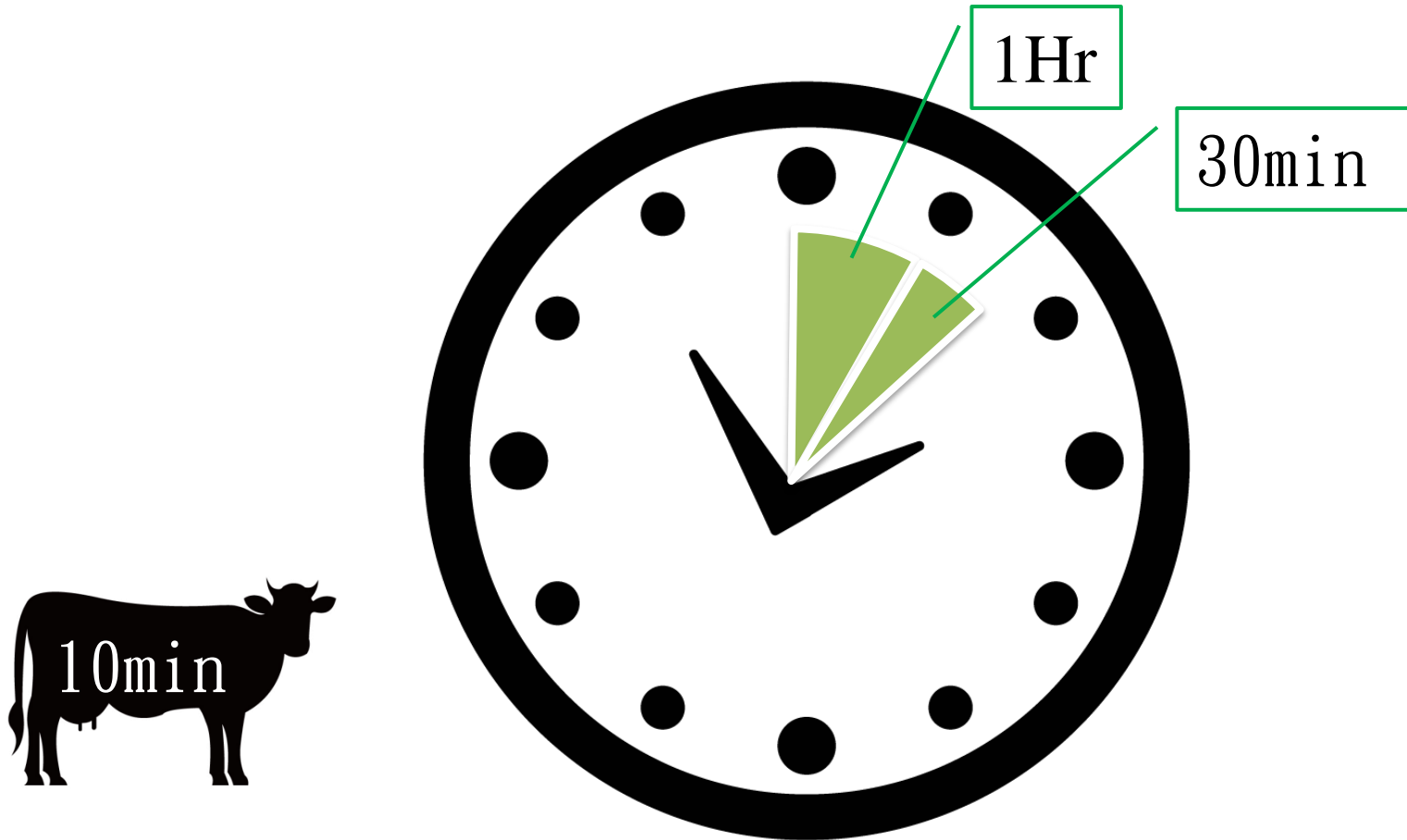
套杯

收杯

後藥浴



臺灣擠乳作業 Milking procedure





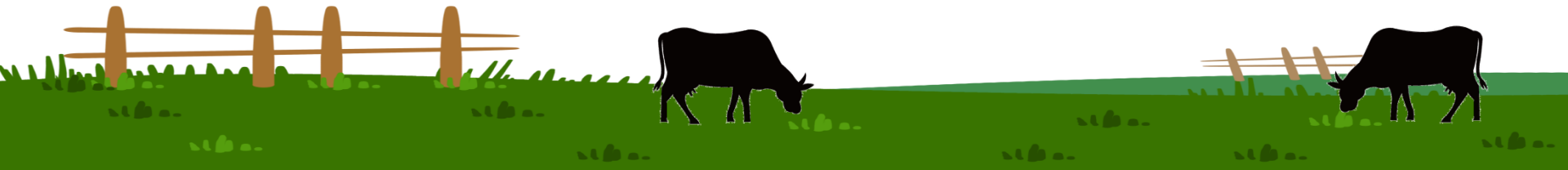
臺灣畜舍清潔

BARN CLEANING

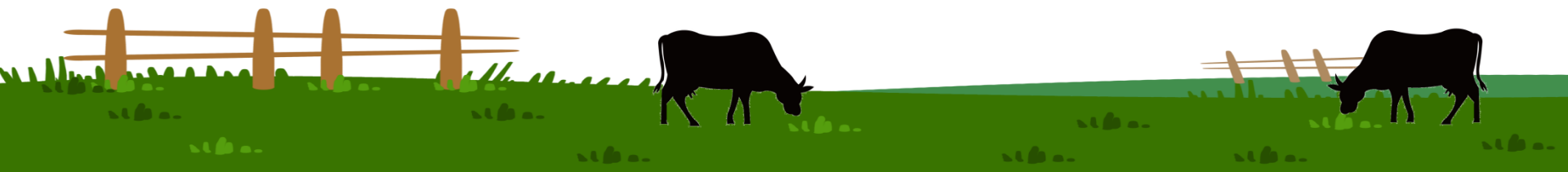
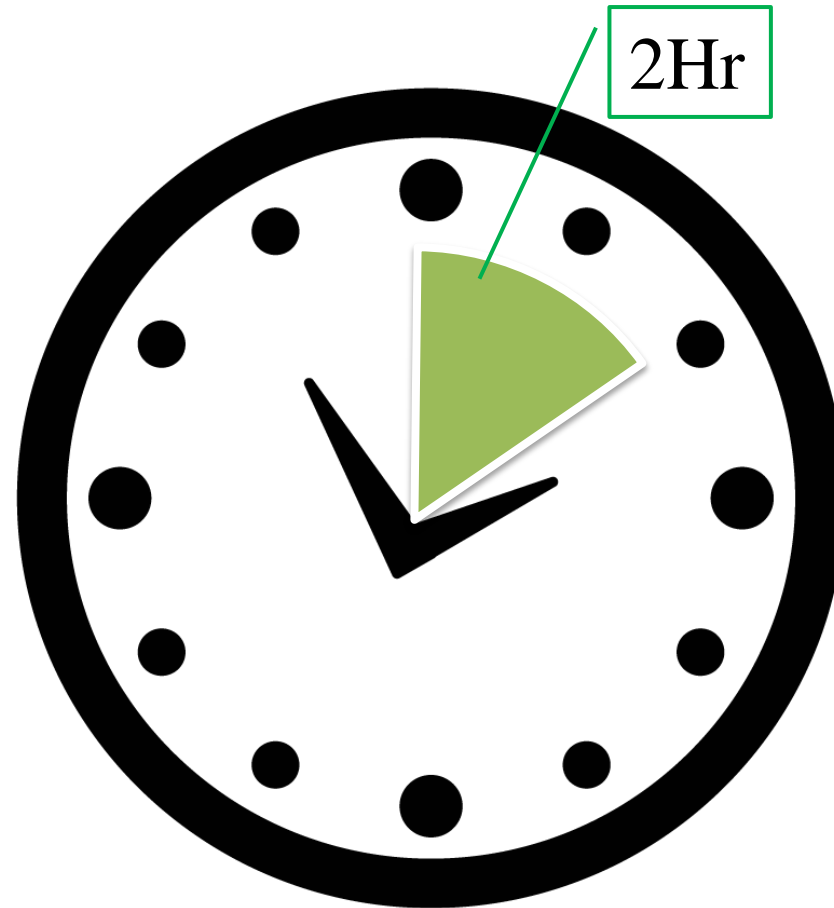


臺灣畜舍清潔 Barn cleaning

- 水洗畜舍
- 墊料清除



臺灣畜舍清潔 Barn cleaning





臺灣廢水處理

WASTE DISPOSAL



臺灣廢水處理 Waste disposal



固液分離

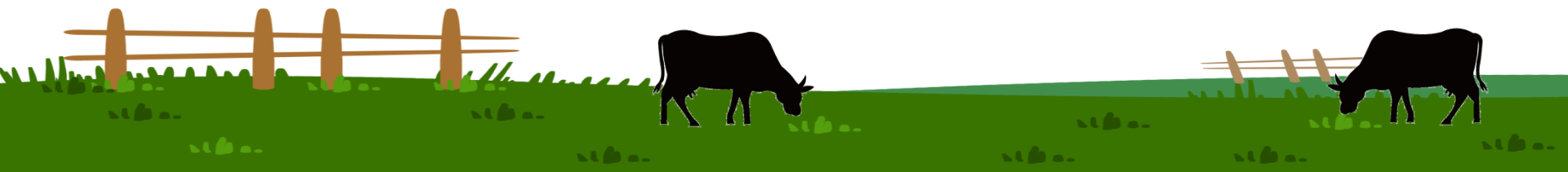
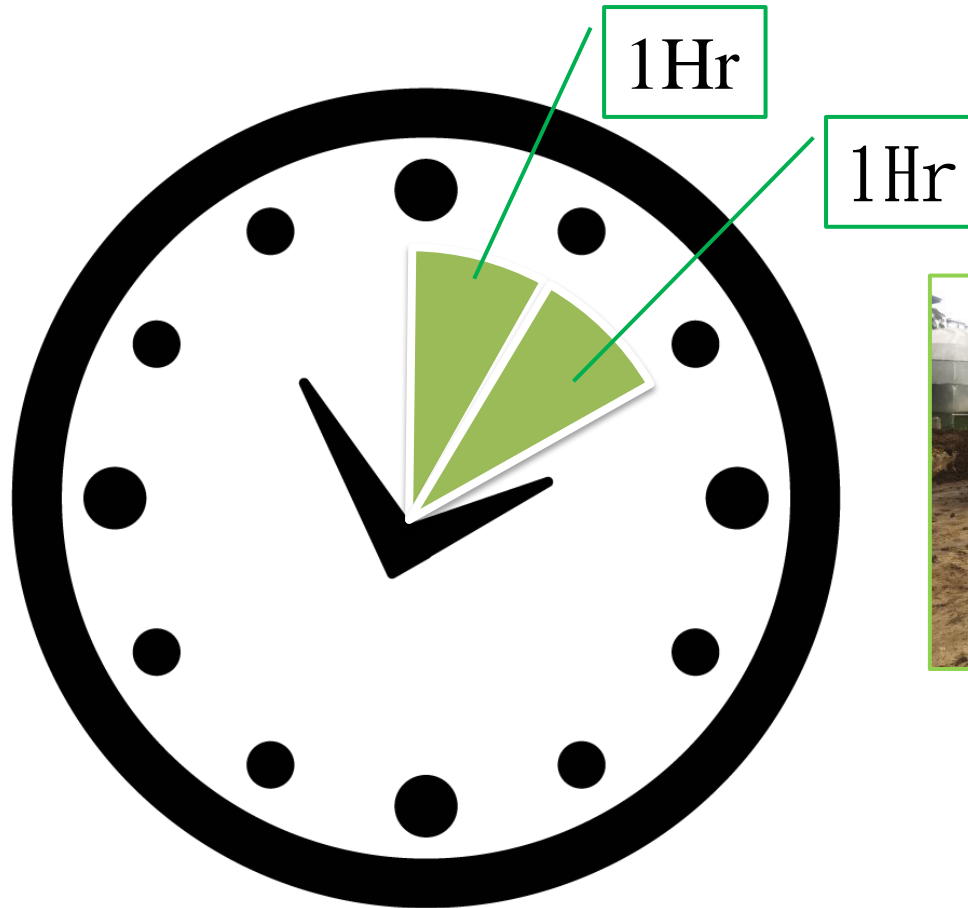
初沉

厭氣

曝氣

放流

臺灣廢水處理 Waste disposal





省工方案

REDUCE WORKING HOURS



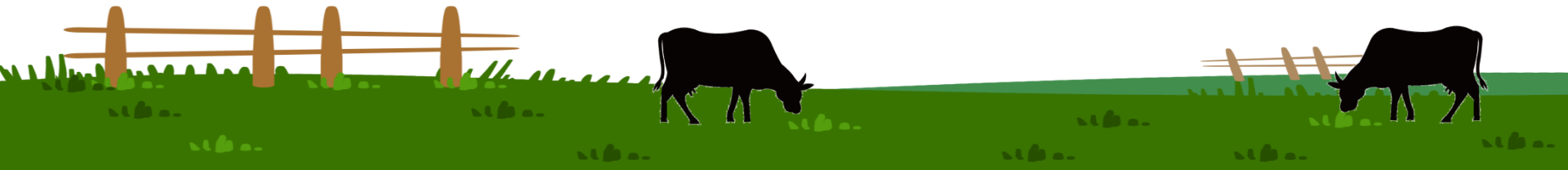
省工方案 Reduce working hours

- 擠乳機器人
Robotic-milking system



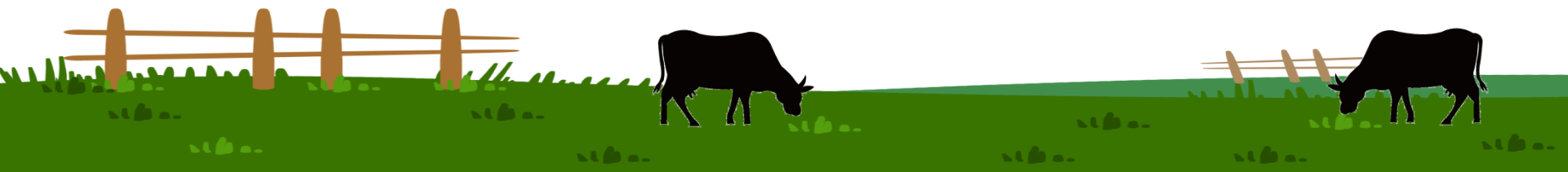
省工方案 Reduce working hours

- 吸糞機器人
Barn cleaner

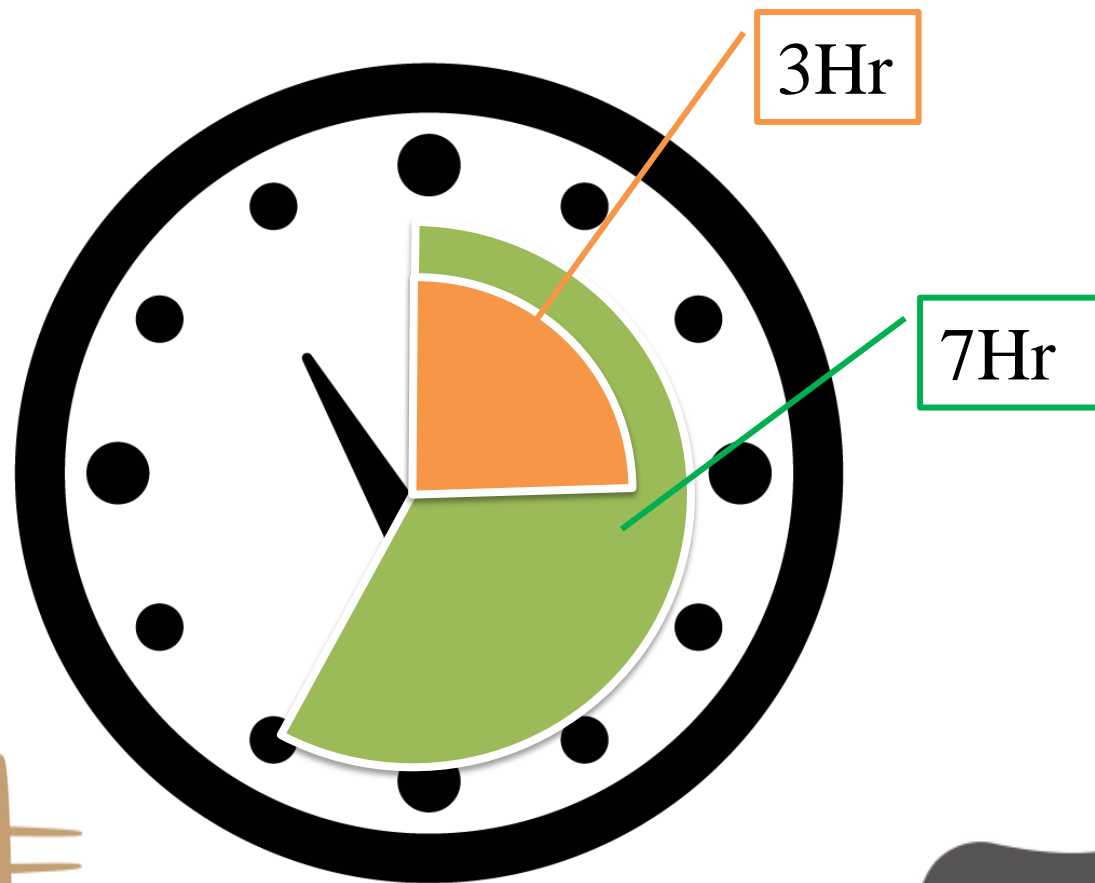


省工方案 Reduce working hours

- 牛糞固液分離機
Separator



小結



乳牛群餵養飼料時程安排與勞動力需求 子議題B

Needs on Farming Labour and Feeding Schedule Arrangement in Dairy Cattle Herds Part B

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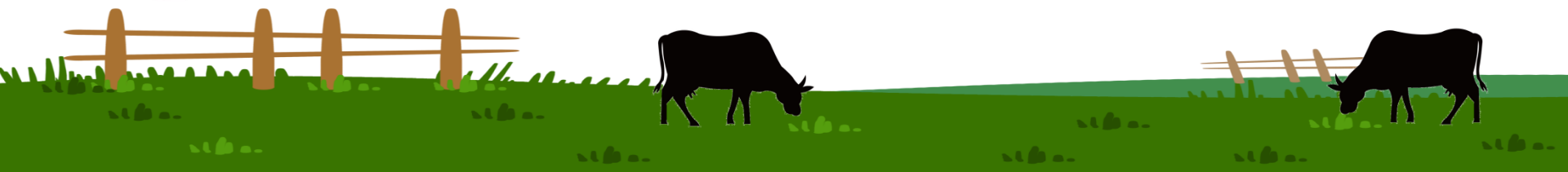
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行政院農業委員會
畜產試驗所
Livestock Research Institute



THE TRADE COUNCIL OF DENMARK, TAIPEI
Ministry of Foreign Affairs of Denmark



傳統人力飼養規劃 Farming labor and feeding schedule arrangement without robots

時間 time 工作work	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24
擠乳 milking			2-3					2-3				
餵養牛隻 feeding				1				1			1	
監測牛隻健康 monitoring cow's health			1					1			1	
繁殖與母牛分娩管理 reproduction				1				1			1	
仔牛飼養 calf caring				1-2					1-2			
清理牛隻糞尿及環境整潔 cleaning				1					1			

數字代表所需人力 Numbers means manpower

餵養牛隻 feeding

■ 傳統TMR 餵飼 Conventional feeding(TMR) system

酪農耗費約20%時間在餵飼牛隻上
Dairy farmers spend about 20% of their
time on feeding.

4-5hrs



餵養牛隻 feeding

➤ 傳統TMR 餵飼與自動餵飼系統比較 **Conventional vs. automatic feeding systems**

- 節省能源與人力分別約 97% 與 79%

Saving 97% of energy costs and 79% of labor.

- 達到更精準管理

Achieving more precise of management

- 維持飼糧品質，減少飼糧在濕熱的臺灣發生二次發酵的問題

Maintaining a stable diet quality, preventing second feed fermentation in Taiwan.

- 提高餵飼次數，增加牛隻採食量

Increasing feeding frequencies and dry matter intake of cattle.

- 對於飼養人員時間利用更有彈性，且縮短工時勞力，提升生活品質

Time arrangement more flexible for farmers, shortening working hours and improving life quality.

餵養牛隻 feeding

- 傳統人力推料 (左)
Feed pushing by labor (left)
- 使用自動推料機進行推料(右)
Feed pushing using automatic feed pusher (right)



餵養牛隻 feeding

➤ 傳統人力推料與自動推料機比較 Labor vs. automatic feed pusher

- 在高溫多濕的台灣，提高牛群全體的乾糧攝取量增加6~10%

Under hot and humid climate Taiwan, increase the dry matter intake by 6-10%.

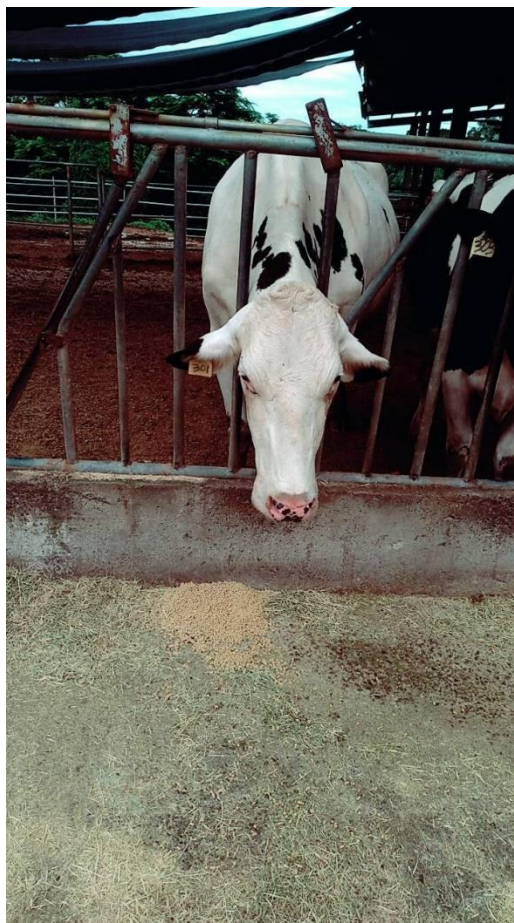
- 有效取代推料人力燃料成本，合計每日節省約2小時。

It effectively replaces about 2 hours workload every day, and saves pushing manpower and energy cost.

監測牛隻健康 Cow' s health monitoring

- 傳統人力觀察牛隻健康
Conventional man
observation of cow' s
health

1-4hrs

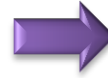
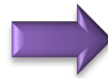
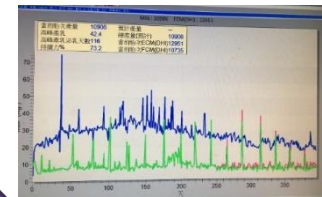


監測牛隻健康 Cow' s health monitoring



藉由頸圈或是腳環的管理系統監控牛隻活動量與反芻狀況。
Monitoring cow' s activity and rumination by neck collars or foot rings.

● 牧場管理系統 Livestock management systems



透過手機、
電腦接收資料

Collect data through
the cell phones and
computers.



藉由管理系統得知牛隻乳量、活動量與反芻量等資料。

Milk yield, activity and rumination are analyzed by management system.

監測牛隻健康 Cow' s health monitoring

➤ 傳統TMR 餵飼與自動餵飼系統比較

Conventional man observation vs. livestock management system

- 達到更精準管理

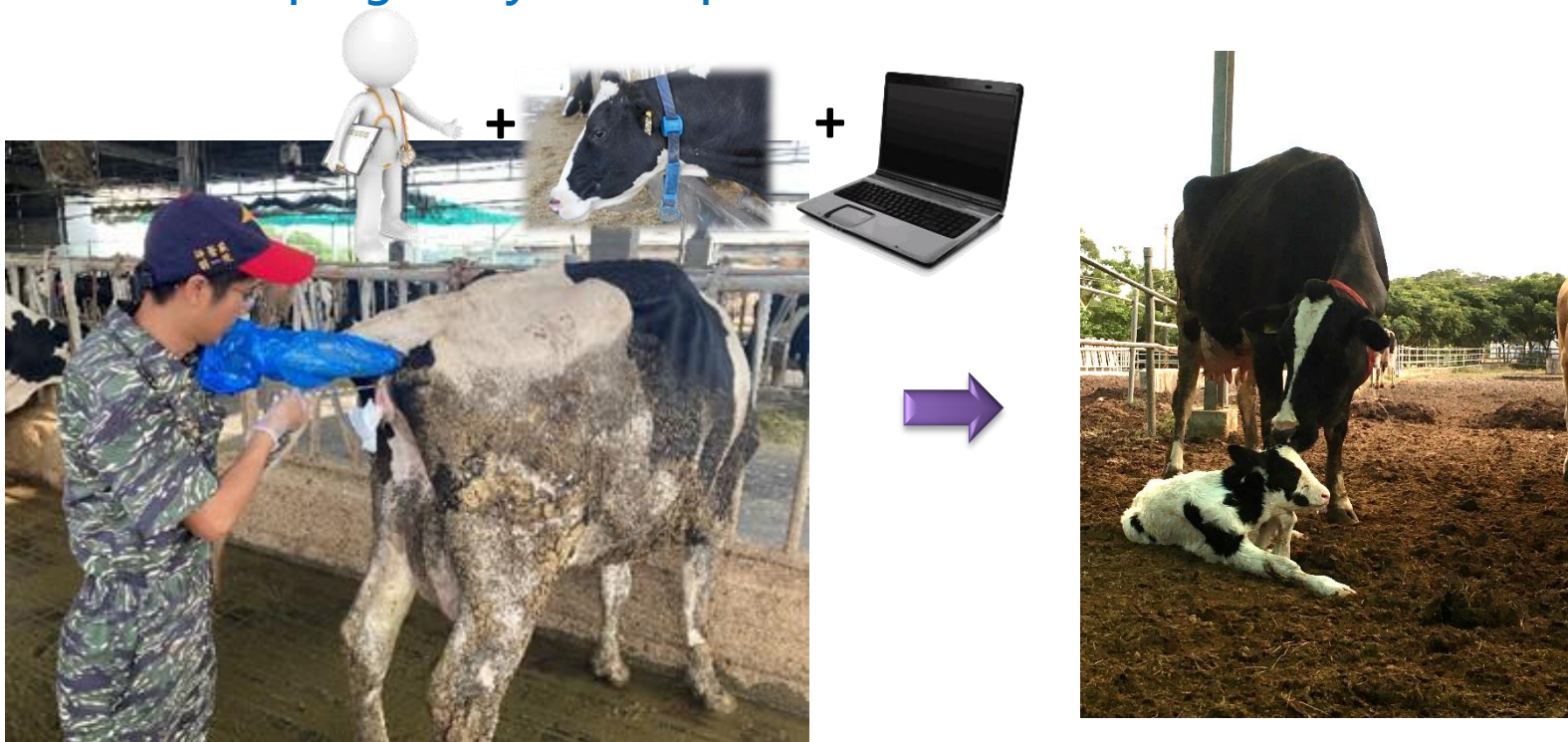
Achieving precise management

- 飼養人員時間利用更有彈性

Time arrangement more flexible for farmers

繁殖與母牛分娩管理 Reproduction

- 傳統人力或管理系統觀察並記錄牛隻發情 → 配種 → 驗孕 → 牛隻分娩
Detecting and recording standing heat by veterinarian or management system → AI → pregnancy test → parturition



仔牛照護 Calf caring

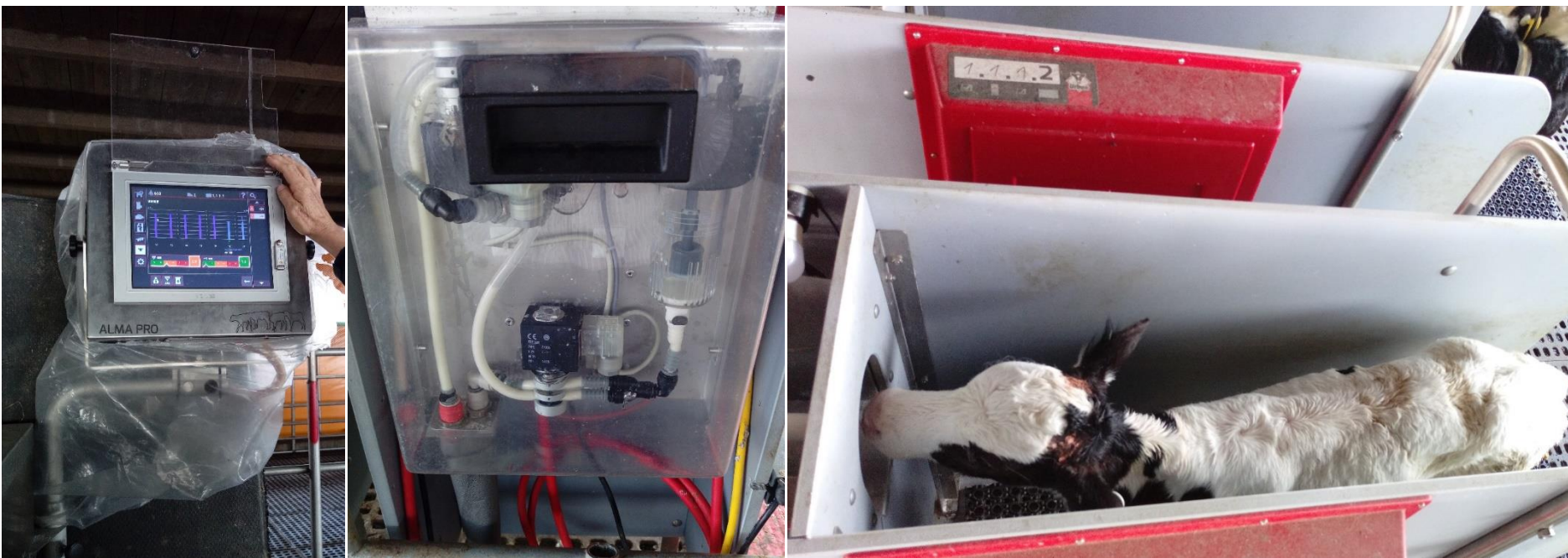
2-3hrs

- 傳統仔牛照護方式
Conventional calf caring



仔牛飼養 Calf caring

■ 自動仔牛餵飼系統 Automatic calf feeder



✓ 每天要仔細檢查並確認仔牛自動餵食系統的清潔程度

✓ The cleanliness of the automatic calf feeder must be checked and confirmed every day

仔牛飼養 Calf caring

➤ 傳統仔牛餵飼與自動仔牛餵飼比較 Conventional vs. automatic calf feeder

- 達到個別仔牛隻精準餵飼

Achieving precise feeding for individual calf

- 清楚了解個別仔牛健康狀況

Knowing individual calves' health by management information

- 節省每日泡製牛奶及餵養時間，總計每日可節省1至2小時

Saving 1 to 2 hours a day of brewing milk and feeding time

- 增加餵飼次數，縮短生長期間

Increasing feeding frequencies, shortening growing period

投入自動化設備之飼養規劃

Farming labour and feeding schedule arrangement **with automatic systems**

時間 time 工作 work	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18	18-20	20-22	22-24
餵養牛隻 feeding			1					1				
監測牛隻健康 monitoring cow's health				1		any time						
繁殖與母牛分娩管理 reproduction			1					1		1		
仔牛飼養 calf caring				1				1				
維持自動化設備功能 check and maintain equipment function				1		any time						
輸入並判讀資料 Input and analyze data				1		any time						

數字代表所需人力 Numbers means manpower

總結 summary

- 勞力飼養時程變化

Changes in labor and feeding schedule

- 飼養人員時間利用更有彈性，提升生活品質

Time arrangement more flexible for farmers and improving life quality

- 花時間檢查並維護設備功能

Spending time to check and maintain equipment function

- 定期將輸入牛隻資料至每個系統

Input cow' s data into each system regularly

- 更多的數據分析，達到更精準的飼養管理

More data for analysis, more precision for management

謝謝指教!

Thank you for your attention!



台灣所使用的牧場管理系統
livestock management systems used in Taiwan

