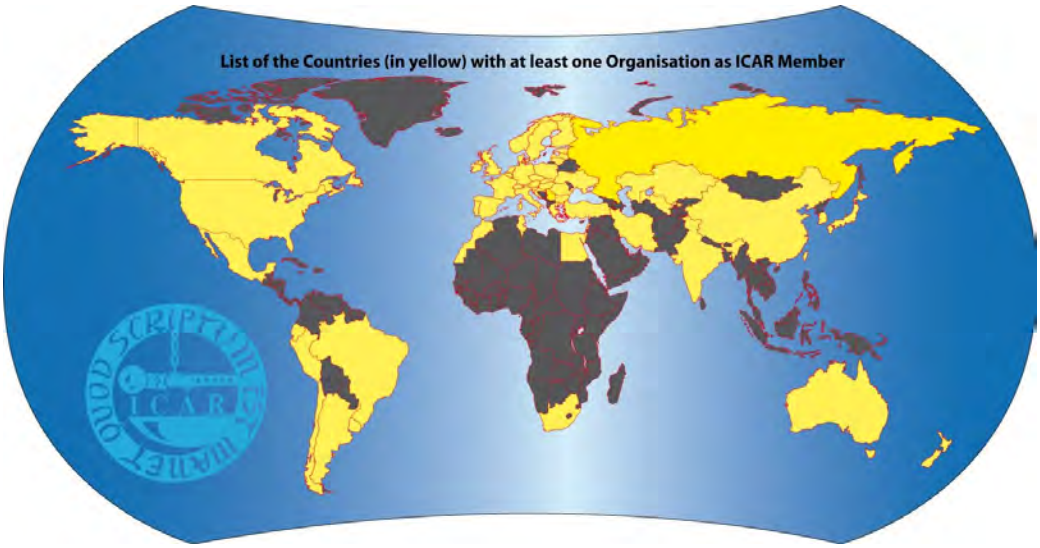
出國報告
出國類別：開會(出席會員國會議)

國際畜政聯盟(ICAR)之會員國2015年會暨科技會議

服務機關：行政院農業委員會畜產試驗所
姓名職稱：王治華研究員兼主任秘書
吳明哲研究員兼遺傳育種組組長
派赴國家：波蘭
出國期間：民國104年6月8日至104年6月13日
報告日期：民國104年8月19日

摘　要

國際畜政聯盟(ICAR)於 1951 年創立，以提升全球乳肉畜產品供應量及其品質，進行經濟動物的性能紀錄及其品質精準國際化為目標。ICAR 會員國一年一次年會及每兩年舉辦一次科技會議。2015 年會員國年會暨科技會議於 6 月 10 至 12 日在波蘭克拉科夫(Krakow)舉辦，計有 41 個國家 352 位人員參加。ICAR 會員國大會於 6 月 10 日上午舉行，隨後科技會議共有 36 篇技術論文報告。第一天會議焦點討論「我們可以從牛乳樣本學習到什麼」有 8 篇、「紀錄數據的諮詢服務」有 8 篇與「廠商展示商品技術說明」有 7 篇。第二天會議焦點討論「乳牛的產乳記錄與肉牛、山羊產肉和綿羊纖維的生長性能」有 7 篇與「基因體學和外表型值在農場應用策略」有 6 篇，以及各執行委員會和工作小組之召集人總結報告會議。各國乳牛群性能改良計畫(DHI)乳樣有多種檢測裝置及方式，利用傅立葉轉換紅外線光譜儀(FTIR)檢測乳成分中之酮體，有助於乳牛健康監測與獸醫早期診療。過去費時費力的乳牛群繁殖性狀與疾病健康資料收集，已有自動紀錄裝置及專家決策系統可供酪農應用，如何有組織系統地把酪農、獸醫、資料處理員及消費端信息整合，讓酪農藉由國家型資料庫之統計數據，作為改善乳牛群飼養管理及治療管理之參據，以降低乳牛的淘汰率。動物健康資料紀錄之整合應用，促使動物健康資料紀錄資訊透明與即時傳輸諮詢服務，進而透過資訊管理促使動物飼養管理軟硬體措施能漸進式的改變，以符合動物福祉、食品安全和環境保護的要求。ICAR 注重動物健康資料標準化，包括收集資料的電子裝置和自動化傳輸系統等智慧型機器，提高資料精準度，臺灣可參考借鏡，進而增進我國動物飼養管理之精準化與採用智慧型機器普及化。年會總結會議宣布 ICAR 會員國年會首度到南美洲智利巴拉斯港(Puerto Varas)舉辦第 40 屆會員國大會暨執行委員工作會議(2016 年 10 月 24 至 28 日)，以及在英國蘇格蘭舉辦 2017 年年會暨科技會議。



國際畜政聯盟(ICAR)會員國 61 國(黃色地區)分布(截至 2015 年 6 月 30 日)(www.icar.org)

目　次

壹、目的

國際畜政聯盟(以下簡稱 ICAR，1951 年創立)為一個非營利的國際組織，為促進各國牧場動物生產性能紀錄之精準化和其種畜經濟性能之遺傳評估，而建立動物重要經濟性狀之定義和性狀測量之標準規範，來改善動物性能紀錄收集、分析的儀器或裝置的精準度。國際畜政聯盟組織架構包括 4 個執行委員會與 12 個工作小組，是由學者專家所組成之團隊規範各種動物紀錄收集之指導方針。各團隊定期開會，並藉由每年舉辦之 ICAR 會員國年會或每兩年舉辦一次之科技會議，來改進或更新標準規範內容。年會期間提供各會員國一個很重要的動物紀錄制度經驗交流及論壇機會，並介紹各國已有足夠功能並可實際應用的動物紀錄技術。因此，ICAR 所提供之畜產經營的技術總是最先進且可廣泛地被各國接受，所提供的指導方針和標準也需適用世界各會員國情況，沒有強求各國使用某一種特定紀錄的方法，但提供了最低需求，以保證紀錄之一致性。所以各國性能紀錄的機構可自由取決各國當地狀況，以決定其特別的性能紀錄之方法。畜產試驗所於民國 99 年 12 月 21 日奉行政院農業委員會指派為國家代表，向 ICAR 遞案申請我國加入為會員國。於民國 100 年 1 月 27 日 ICAR 核准我國以「Taiwan」成為正式會員國，代表人為畜產試驗所黃所長英豪，成為 ICAR 第 51 個會員國。2015 年會員國年會暨科技會議於 6 月 10 至 12 日在波蘭克拉科夫(Krakow)舉辦，計有 41 個國家 352 位人員參加。我國代表人因要公無法出席，本次會議由乳牛繁殖專家王治華研究員兼主任秘書與負責種畜產業推動工作的遺傳育種組吳明哲組長，出席本年度 ICAR 會員國年會暨科技會議，研商國際間乳用動物的乳樣檢測、資料收集及健康資料諮詢服務等產業化科技應用工作。本次與會目的也因我國畜產試驗所新竹分所之牛乳實驗室代表我國於 2014 年底成為國際乳質檢驗基準實驗室網絡(ICAR Reference Laboratory Network)之成員，而須出席 ICAR-RLN 成員會議。乳質檢驗基準實驗室網絡以傳達優良實驗室操作規範(Good Laboratory Practices)及準則標準來支援生乳檢測實驗室，亞洲地區有日、韓、臺灣各有一個實驗室加入。臺灣成為 RLN 網絡成員後，可參與由 ICAR 轄下國際乳質分析的研究團隊舉辦的精熟能力檢測計畫，並透過國際接軌來展示臺灣乳質分析精準可追溯性，使乳質分析比對具有國際接軌的能力，亦讓我國乳牛具有種原貿易價值及乳製品國際化之可能。

貳、過程

日期	起迄地點	活 動 記 要
6 月 8 日（一）	臺灣高雄-香港-荷蘭–波蘭	去程自臺灣高雄搭機經香港及荷蘭轉機，當晚抵達波蘭華沙蕭邦機場
6 月 9 日（二）	波蘭 華沙-克拉科夫	1. 參訪波蘭乳質分析國家實驗室及乳牛育種協會華沙工作站 2. 自華沙至克拉科夫
6 月 10 日（三）	波蘭克拉科夫	參加國際畜政聯盟會員國 2015 年年會暨科技會議： ● ICAR General Assembly 會員國年會 ● Polish agriculture 波瀾農業 ● Technical session I: What else can we learn from milk sample? 議題一、乳樣信息使用 ● Technical session II: Advisory services built on recording data 議題二、記錄數據應用 ● Technical session III: Manufacturers showcase 議題三、廠商供應鏈 ● Reference Laboratory Network members meeting 國際乳質檢驗基準實驗室網絡成員會議
6 月 11 日（四）	波蘭克拉科夫	參加國際畜政聯盟會員國 2015 年年會暨科技會議：： ● Technical session IV: Milk recording in cattle, meat and fibre performance in sheep, goats and beef cattle 議題四、牛羊之乳肉毛質量檢定 ● Technical session V: Genomics at farm and phenotyping strategies 議題五、基因體資料應用與選種方針 ● Technical session VI: CoQ auditors workshop 議題六、品質確保成效 ● Technical session VII: Joint Session 議題七、工作小組總結會議
6 月 12 日（五）	波蘭克拉科夫	參加國際畜政聯盟會員國 2015 年年會主辦國畜牧業參訪行程
6 月 13 日（六）	波蘭克拉科夫-荷蘭-桃園	返程自波蘭克拉科夫經荷蘭阿姆斯特丹轉機返抵桃園機場

參、心得

國際畜政聯盟(ICAR)以提升全球乳肉畜產品供應量及其品質，進行經濟動物的性能紀錄及其品質精準國際化為目標。ICAR 會員國一年一次年會及每兩年舉辦一次科技會議。2015 年會員國年會暨科技會議於 6 月 10 至 12 日在波蘭克拉科夫(Krakow)舉辦，計有 41 個國家 352 位人員參加。ICAR 會員國大會於 6 月 10 日上午舉行，大會宣布 2016 年 10 月 24 至 28 日在智利巴拉斯港(Puerto Varas)舉辦第 40 屆擴大年會。本次科技會議共有 36 篇技術論文報告，從各國乳牛群性能改良計畫(DHI)乳樣有多種檢測裝置及方式，利用傅立葉轉換紅外線光譜儀(FTIR)檢測乳成分中之酮體有助於乳牛健康監測與獸醫早期診療。過去費時費力的乳牛群繁殖性狀與疾病健康資料收集，已有自動紀錄裝置及專家決策系統可供酪農應用，如何把紀錄數據的諮詢服務，由生產端酪農、獸醫、資料處理員到消費端加以整合，農民藉由有組織系統的國家型資料庫之統計數據，可作為改善乳牛群飼養管理及治療管理之參據，以降低乳牛的淘汰率，提高生產效益。透過資訊管理有關動物健康資料紀錄之整合應用，及動物健康資料紀錄資訊透明與即時傳輸諮詢服務，促使動物飼養管理軟硬體措施漸進式的改變，以符合國際上動物福祉、食品安全和環境保護的要求。ICAR 注重動物健康資料標準化，包括收集資料的電子裝置和自動化傳輸系統等，臺灣可參考借鏡，進而增進我國畜產動物福祉及強化畜產品品質。

本次會議由乳牛繁殖專家王治華研究員兼主任秘書與負責種畜產業推動工作的遺傳育種組吳明哲組長，出席本年度 ICAR 會員國年會暨科技會議，研商國際間乳用動物的乳樣檢測、資料收集及健康資料諮詢服務等產業化科技應用工作。本次與會目的也因我國畜產試驗所新竹分所之牛乳實驗室代表我國於 2014 年底成為國際乳質檢驗基準實驗室網絡(ICAR Reference Laboratory Network)之成員，而須出席 ICAR-RLN 成員會議。乳質檢驗基準實驗室網絡以傳達優良實驗室操作規範(Good Laboratory Practices)及準則標準來支援生乳檢測實驗室，亞洲地區有日、韓、臺灣各有一個實驗室加入。臺灣成為 RLN 網絡成員後，可參與由 ICAR 轄下國際乳質分析的研究團隊舉辦的精熟能力檢測計畫，並透過國際接軌來展示臺灣乳質分析精準可追溯性，使乳質分析比對具有國際接軌的能力，亦讓我國乳牛具有種原貿易價值及乳製品國際化之可能。

一、主辦國波蘭農業概況

國際畜政聯盟(ICAR)會員國 2015 年年會暨科技會議主辦國波蘭位於歐洲中北部，北濱波羅的海及與俄羅斯海外領土卡立寧格勒鄰接，東北與立陶宛接壤，東與白俄羅斯，東南與烏克蘭為鄰，南部分別與捷克及斯洛伐克接壤，整個西部則與德國交界。波蘭國土大略呈正方形狀，東西與南北國境相距各約 600 公里，全國面積 312,685 平方公里，在歐盟國家排名第六，較我國大 9 倍。除南部與捷克、斯洛伐克接壤者為山區外，絕大部分為海拔 300 公尺以下之平原，森林面積占 27%，土地 60%為沙質土壤，農牧業發達**(圖 1A)**。波蘭人種主要為波蘭人(占 97%)，人口 38,346,279 人(2014 年)，波蘭人民平均壽命為 75.6 歲，男性 72.74 歲，女性 80.8 歲，失業率約 10.7%。波蘭被列為世界文化遺產者有 13 處，包括 Warsaw、Krakow、Torun 等市舊城，Wieliczka 地下鹽礦，Auschwitz 集中營等，首都華沙(Warsaw)位於波蘭中部偏東，為政府所在地及商業大城，人口約 172 萬人，與臺北市為姐妹市。2014 年 12 月底資料顯示波蘭 DHI 測乳近 74 萬頭乳牛(14 個品種，739,638 頭)，每戶平均飼養 20.1 頭/農戶，平均乳量 7 ,582 公斤/頭，乳脂肪率 4. 08%，乳蛋白質率 3.36%。波蘭的豬肉質量在歐盟和世界上皆居領先的地位，近十年來對歐盟的豬肉出口量增長快速達 2.2 百萬公噸，僅次於美國 2.4 百萬公噸，全球排名第二。

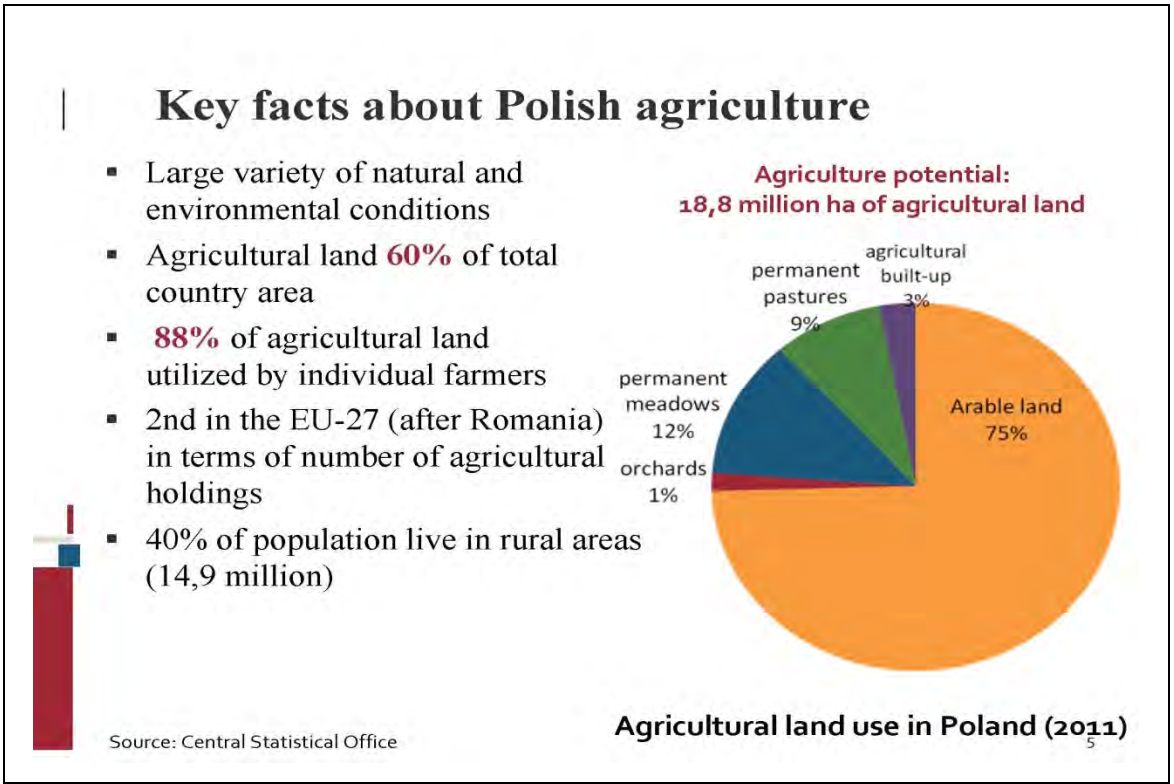
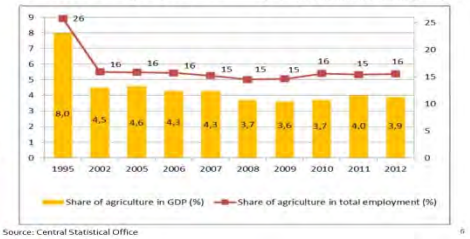


圖 1A. 波蘭農業用地及歐盟地位

Key Data

- Population 38,5 mln inhabitants
- GDP per capita 10 098 EUR (at current price)
- GDP per capita 17 172 EUR (at Purchasing Power)
- Index of consumner prices 1,0 annual %
- Unemployment rate 10,7% of labour force
- Real GDP growth rate 1,3% 2013 (* 3,4%)

Polish agriculture share in GDP & total employment

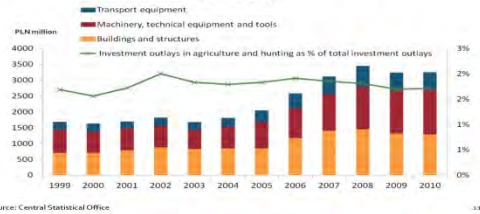


Source: Central Statistical Office

Production - place of Poland in the EU

Investment outlays in Polish agriculture

Investment outlays in agriculture and hunting in Poland (current prices)

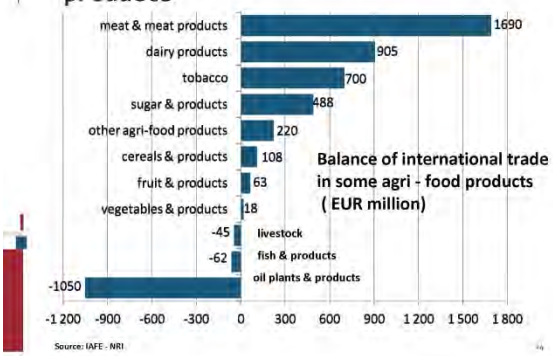


Source: Central Statistical Office

Poland's foreign trade in agri-food products

Source: Institute of Agricultural and Food Economics-National Research Institute (IAFE-NRI), Ministry of Finance 2011* preliminary

Foreign trade in agri-food products



Source: IAFE - NRI

圖 1B. 波蘭國土大略呈正方形狀，多為平原，土地 **60%**為沙質土壤，農牧業發達

ICAR 會議地點克拉科夫(Krakow)係故都，為歷史文化及觀光重鎮，人口約 75.6 萬人，擁有便捷的輕軌電聯車網絡大眾交通運輸系統，飲食文化以豬肉製品香腸、燻肉、火腿及水果乳酪製品為主 (圖 2)。

圖 2. 波蘭飲食文化以豬肉製品香腸、燻肉、火腿及水果乳酪製品為主會議場所克拉科夫擁有便捷的輕軌電聯車網絡大眾交通運輸系統

二、參訪波蘭乳牛育種協會華沙工作站及乳質分析國家實驗室

6 月 9 日自波蘭華沙至克拉科夫路程中參訪波蘭乳牛育種協會華沙工作站、基因檢測實驗室及乳質分析國家實驗室 **(圖 3)**，波蘭乳牛育種協會華沙工作站 2 班制及 3 台乳質快速精準例行檢測儀 Fourier Transform Infrared (FT-IR)，每台檢測儀 2 位工作人員為一組，能有效率的每年分析波蘭 DHI 測乳將近 74 萬頭乳牛乳樣成分，工作量相當龐大。Fourier Transform Infrared (FT-IR)光譜儀是一種新型乳質分折的方法，除可分析傳統的參數如脂肪、蛋白質(真蛋白質和粗蛋白質)、酪蛋白、乳糖、固形物、尿素、枸櫞酸、游離脂肪酸、PH、冰點下降；亦可同時分析一些新增參數包括脂肪酸、BHB 和丙酮 (酮病篩選指標) 及異常的牛乳，還有一些可供檢測之參數如牛乳的凝結性質、可滴定酸度、及蛋白質組合物。又例行的乳質分析可新增檢測出之參數如影響高產乳牛的代謝疾病酮病，當牛隻產出的能量(生產牛乳之能量)比輸入能量(飼料採食及從脂肪組織釋出之能量)高時會發生。初級的酮病(Primary ketosis)是提供給母牛的飼料太少 (或供給的飼料能量精料太低)時發生。次級酮病發生是母牛停止採食而產乳量高導致瘤胃過酸或有其他疾病的發生。上述兩種情況均係由脂肪組織釋出轉換大量的能而致「丙酮」和「BHB」分泌並經血液而殘留乳中。一旦酮病在牛群內藉由乳樣分析檢測出，必須藉由營養專家或獸醫師的建議調整牛群飼養管理來解決。世界各國現今 DHI 計畫利用個別牛隻乳樣，以例行乳質分析儀來檢測樣品中之丙酮和 BHB 殘留，可作為農戶牛群飼養管理改善一個很重要的依據。事實上酮病問題可預先以良好的牛群營養保健及飼養管理來預防，使牛隻淘汰率及其乳量損失降低。

波蘭牛隻基因檢測實驗室使用最新 SNP 晶片檢測儀器進行牛隻遺傳評估和選拔，包含 8 個指標及 32 個性狀，並使用發展不同密度的 DNA 晶片檢測乳牛，基因體選拔為一種分子輔助標記之育種技術，可偵測遺傳疾病、健康、產能、繁殖及體型等性狀，基因體選拔的最大優點是能縮短證明為優質的牛隻所需時間，加速了更新替補牛群遺傳性能改進，對於檢測出遺傳疾病的牛隻則可即時淘汰。此種基因體選拔技術已經成為世界趨勢，尤其乳業先進國家已陸續建立荷蘭牛和其他乳牛品種例行的基因體遺傳檢測評估工作。

波蘭乳質分析國家實驗室檢測生乳品質及提供比對樣品工作外，並以新式「乳成分及體細胞測定儀」檢驗，檢驗項目包括酪蛋白、游離脂肪酸、總飽和脂肪酸、總不飽和脂肪酸和酮體等，以建立公平公正之比對機制。波蘭基因檢測實驗室及乳質分析國家實驗室， 還有一個特色，2 個實驗室凡是有溫控的儀器均設有安全監控設施，以確保其分析及培養試驗的正確性，值得國內實驗室參考。**(圖 4)**

圖 3. 參訪乳牛育種協會華沙工作站及基因檢測實驗室





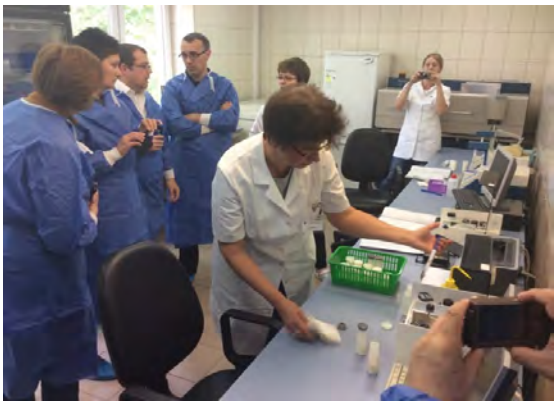



圖 4. 參訪波蘭乳質分析國家實驗室乳成分分析檢驗流程及溫度監控設施

三、ICAR 2015 會員國年會暨科技會議之重點活動

(一) 國際畜政聯盟(The International Committee for Animal Recording, ICAR)簡介

ICAR組織的主幹由4個工作執行委員會和12個工作小組等所組成。轄下的「執行委員會」與「工作小組」之差別，前者是永久性的且提供永久服務，後者理論上是永久性的，但他們的服務主要是根據專長領域的技術，來發展制訂及修正紀錄之指導方針和標準規範。每個工作小組由7~20人組成，以其專門知識領域技術定期來更新或修正指導方針和標準。

1. ICAR 轄下四個執行委員會(Sub-Committee; 簡稱 SC)**分別為：**

- 動物標識執行委員會(Animal Identification SC)
- 紀錄儀器執行委員會(Recording Devices SC)
- 乳質分析執行委員會(Milk Analysis SC)
- 國際種公牛協會(InterBull)

2. ICAR之12個工作小組(Working Group, WG)分別是：

- 乳牛之擠乳紀錄工作小組(WG on Dairy Cattle Milking Recording)
- 動物資料紀錄 (WG on Animal Recording Data)
- 遺傳分析工作小組(WG on Genetic Analysis)
- 功能性狀工作小組(WG on Functional Traits)
- 山羊與綿羊羊乳紀錄工作小組(WG on Milk Recording in Goats and Sheep)
- 發展中國家工作小組(WG on Developing Countries)
- 國際肉牛性能紀錄與評估工作小組(WG on Interbeef)
- 人工授精和相關技術工作小組(WG on Artificial Insemination and Relevant Technologies)
- 羊毛纖維性能紀錄工作小組(WG on Animal Fibre)
- 系譜紀錄工作小組(WG on Parentage Recording)
- 體型紀錄工作小組(WG on Conformation Recording)
- 動物福祉紀錄工作小組(WG on Animal Welfare Recording)

ICAR之「執行委員會」與「工作小組」的工作人士都是志願的，目前有160多位技術學者、專家，他們把時間和專門知識志願地貢獻給ICAR。 以編訂ICAR之指導方針和標準，這些技術學者專家之團隊定期開會，並向ICAR大會提議、改進與增減以更新指導方針的內容。因此ICAR所提供之畜牧經營產業上的技術總是領先的且廣泛地被各國接受，所提供的指導方針和標準也適用於各國狀況，沒有強求各國使用某一種特定紀錄的方法，但提供了最低需求，以保證紀錄之一致性。所以各國性能紀錄的機構可自由取決各國當地狀況，以決定其特別的性能紀錄之方法。

(二) ICAR會員國2015年年會摘要

2015年會員國年會暨科技會議於6月10至12日在波蘭克拉科夫(Krakow)舉辦，計有41個國家352位人員參加。ICAR會員國大會於6月10日上午舉行，隨後科技會議共有36篇技術論文報告。第一天會議焦點討論「我們可以從牛乳樣本學習到什麼」有8篇、「紀錄數據的諮詢服務」有8篇與「廠商展示商品技術說明」有7篇。第二天會議焦點討論「乳牛的產乳記錄與肉牛、山羊產肉和綿羊纖維的生長性能」有7篇與「基因體學和外表型值在農場應用策略」有6篇，以及各執行委員會和工作小組之召集人總結報告會議。年會總結會議宣布ICAR會員國年會首度到南美洲智利巴拉斯港(Puerto Varas)舉辦第40屆會員國大會暨執行委員工作會議(2016年10月24至28日)，以及在英國蘇格蘭舉辦2017年年會暨科技會議。

(三) ICAR 2015科技會議(ICAR 2015 Technical Workshop)

6 月 10 至 11 日進行的科技會議共有 36 篇技術論文報告，第一天會議焦點討論「我們可以從牛奶樣品中學習到什麼」有 8 篇、「紀錄數據的諮詢服務」有 8 篇與「廠商展示商品技術說明」有 7 篇，第二天會議焦點討論「乳牛的產乳記錄，肉牛、山羊產肉和綿羊纖維的生長性能」有 7 篇 與「基因體學和外表型在農場應用策略」有 6 篇及二場的工作會議。「我們可以從牛奶樣品中學習到什麼」，從各國乳牛群性能改良計畫(DHI)乳樣有多種檢測裝置及方式，利用傅立葉轉換紅外線光譜儀(FTIR)檢測乳成分中之酮體有助於乳牛健康監測與獸醫早期診療。「紀錄數據的諮詢服務」，過去費時費力的乳牛群繁殖性狀與疾病健康資料收集，已有自動紀錄裝置及專家決策系統可供酪農應用，如何由生產者農民、獸醫、資料處理員到消費者，農民藉由有組織系統的國家型資料庫之統計數據，可作為改善乳牛群飼養管理及治療管理之參據，以降低乳牛的淘汰率。透過資訊管理有關動物健康資料紀錄之整合應用，及動物健康資料紀錄資訊透明與即時傳輸諮詢服務，將促使動物飼養管理漸進式的改變軟硬體措施，以符合動物福祉、食品安全和環境保護的要求。ICAR2015 科技研討會是一個很重要動物紀錄制度與檢驗儀器分析的經驗交流論壇。目的是介紹從乳樣資料的收集與分析到實際農民應用的紀錄數據的諮詢技術服務**(5)**。 ICAR 2015 科技研討會及動物健康資料會議所發表討論的技術和內容已經放置在 ICAR 網站： http://www.icar.org/Documents/Krakow_2015/index.htm

ICAR 2015 科技研討會動物自動化紀錄新裝置及檢測儀器產品展示會場**(圖 6)**，本次展示會場分 2 個展區共有 22 個參展廠商參與，從省時省工經營的自動感測裝置和自動化傳輸系統到乳樣自動化分析檢驗設備及基因檢測晶片等等展示商品的介紹與實機的觀摩與影片播放，展示會場也提供輕鬆舒適的商談桌及茶點供與會者洽談，以促進溝通媒合商機。

本次與會目的也因我國畜產試驗所新竹分所之牛乳實驗室代表我國於 2014 年底成為國際乳質檢驗基準實驗室網絡(ICAR Reference Laboratory Network)之成員，而須出席 ICAR-RLN 成員會議。乳質檢驗基準實驗室網絡以傳達優良實驗室操作規範(Good Laboratory Practices)及準則標準來支援生乳檢測實驗室，亞洲地區有日、韓、臺灣各有一個實驗室加入。臺灣成為 RLN 網絡成員後，可參與由 ICAR 轄下國際乳質分析的研

究團隊舉辦的精熟能力檢測計畫，並透過國際接軌來展示臺灣乳質分析精準可追溯性，使乳質分析比對具有國際接軌的能力，亦讓我國乳牛具有種原貿易價值及乳製品國際化之可能。

圖5. ICAR 2015會員國大會暨科技研討會會員踴躍討論之會場與交誼室

圖 6. ICAR 2015 科技研討會動物自動化紀錄新裝置及檢測儀器產品展示會場

四、 主辦國波蘭畜牧業參訪行程

6月12日分別由 ICAR 2015主辦國波蘭安排出席人員分三梯次參訪團參訪波蘭乳牛、肉牛、種馬等牧場經營設施，臺灣分配到第二梯次參訪團參訪行程。

上午安排參訪第一家牧場有經歐盟認證肉牛場，自家3人經營小型家庭農戶，完全自給自足生產方式，經管有51公頃農地(30公頃承租地)，作物收成時雇短期工協助，其中34公頃種植如大麥、小麥、黑麥等麥類及甜菜、青貯玉米等農作物；另17公頃為牧草地種植類似國內的盤固草。動物生產規模不大為25頭(*Limousine*)肉牛及100頭豬，肉牛外觀看來非常有肉質感，公牛平均日增重1.2-1.3公斤，母牛平均日增重0.9-1.1公斤，飼養兩年上市屠宰出售，冬季則以玉米青貯及乾草餵飼。**(圖7)**

參訪第二家Michalow Stud 農業公司轄下的乳牛場及種馬場經營設施，員工數48人，擁有土地639公頃，其中620公頃農地種植如大麥、小麥、黑麥等麥類及牧草作物；620公頃當中140公頃農地種植玉米，63公頃農地種植苜蓿，這兩種作物主要提供給轄下荷蘭乳牛場與娟姍乳牛場完全混和日糧使用。其中荷蘭乳牛場位於波蘭Lubcza，2×9魚骨式擠乳設施，飼養190頭泌乳牛及200頭女牛與小牛，乾草墊料式牛床，牛隻上床率90%以上，在波蘭實屬相當有規模的乳牛場，其乳牛種原與冷凍精液主要來自美國與加拿大，2014年平均乳量10,757公斤/頭，乳脂肪率 3. 95%，乳蛋白質率 3.33%，產犢間距447天，實屬優質牧場。**(圖8)**

下午則安排參訪 Michalow Stud 農業公司轄下位於波蘭 Michalow 同一處飼養的娟姍乳牛場及種馬場經營設施，其中娟姍乳牛場 2×4 魚骨式擠乳設施，飼養 130 頭泌乳牛及 150 頭女牛娟姍乳牛場，2014 年平均乳量 7,687 公斤/頭，乳脂肪率 5. 27%，乳蛋白質率 3.94%，產犢間距 408 天。木造小牛舍抗暑防寒，運動場區充足，不像臺灣小牛只能在狹小的小牛欄飼育。娟姍乳牛場的乳因具有高蛋白質及脂肪率的特性，牛乳主要提供製作乳酪。其中展示會場一頭 10 歲娟姍母牛現今產乳量仍超過 10,000 公斤，體態清秀，深具波蘭娟姍乳牛冠軍相 **(圖 9)**。參訪 Michalow Stud 具有 60 年悠久歷史飼養 400 頭阿拉伯馬規模的種馬場，一進入展覽室，參與世界馬隻比賽各式各樣的獎杯獎牌及馬匹字畫琳瑯滿目宛如博物館呈現在與會者眼前 **(圖 10)**，種馬場 150 頭種馬來自 13 個公系，11 個母系；注重系譜配種，也生產種馬冷凍精液與胚胎，歷年來繁殖產下 3,346 頭小馬，其中 1,500 頭以上外銷澳洲與北美洲。種馬場馬廄與展示場主要為高挑木造建築，雖正值高溫 30 度中午時段，馬廄仍能十分通風涼爽。小馬跟著母馬從小接受訓馬師有系統的調教，以利未來的參賽與展售 **(圖 11)**。

ICAR 2015 主辦國波蘭非常用心的安排克拉科夫議會廳餐宴及古蹟 Wieliczka 地下鹽礦參訪社交活動，以歷史文物介紹歡迎各國貴賓，以增加與會者彼此經驗交流與商討議題機會並促進波蘭的觀光與外交發展 **(圖 12)**。








圖 7. 參訪小型家庭農戶的農地與 *Limousine* 肉牛場








圖 8. 參訪飼養 190 頭泌乳牛及 200 頭女牛荷蘭乳牛場








圖 9. 參訪飼養 130 頭泌乳牛及 150 頭女牛娟姍乳牛場








圖 10. 參訪 **Michalow Stud** 種馬場展覽室參與世界馬隻比賽各式各樣的獎杯、獎牌及馬匹字畫琳瑯滿目宛如博物館

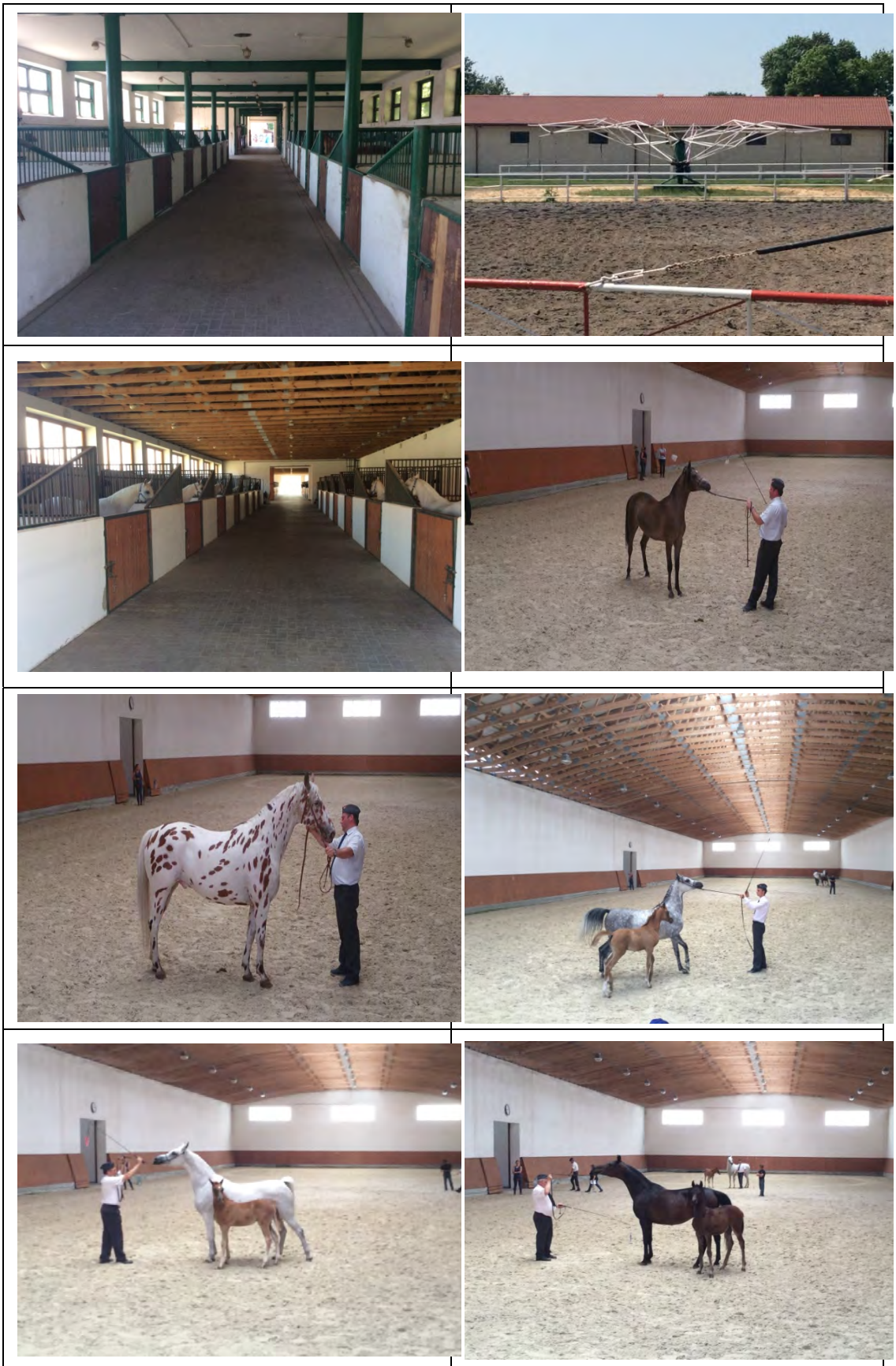


圖 11. 參訪飼養 400 頭阿拉伯馬規模 Michalow Stud 種馬場設施與展售場







圖 12. 參訪波蘭克拉科夫市議會廳古蹟及 **Wieliczka** 地下鹽礦，並於地下鹽礦宴會廳舉辦晚宴

五、波蘭養牛產業團體協會之地位

波蘭養牛產業團體協會(Polish Federation of Cattle Breeders and Dairy Farmers)於1995 年成立，結合 20 個省區的種牛育種團體，進行牛隻育種與供應事務。其主要任務有牛隻系譜登記、乳量乳質檢測、牛隻體型評鑑、飼養繁殖技術推動、產業發展與牛隻展示拍賣會等。協會成員及其運作小組架構如圖 13。

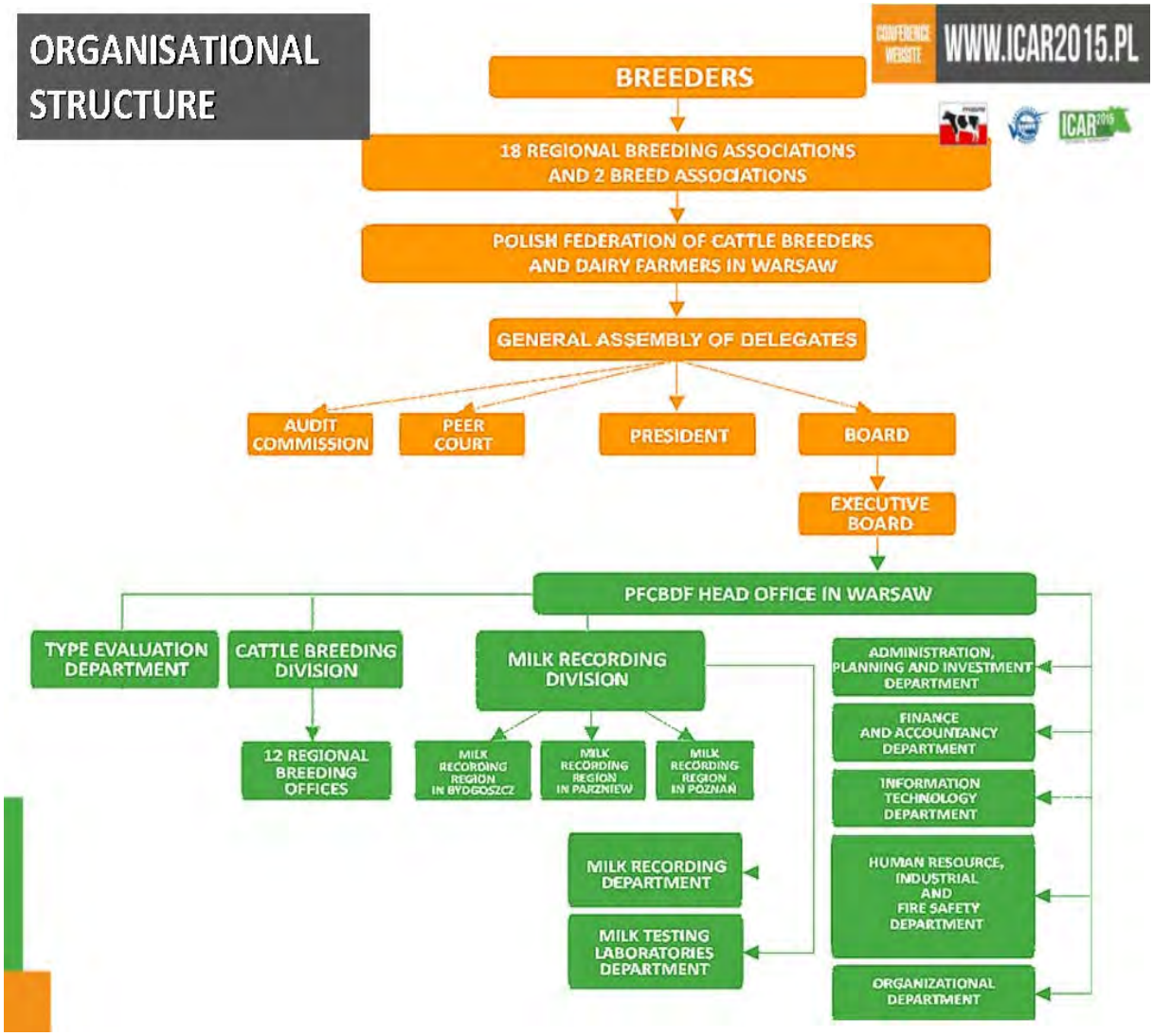


圖 13. 波蘭養牛產業團體協會協會成員及其運作小組架構

波蘭養牛產業團體協會的員工達 1,000 人之規模，並配合國家實驗室及乳肉品管理制度，設置檢驗服務實驗室或工作站(**圖 14**)，確保乳製品符合歐盟規範。亦代表波蘭成為 ICAR 會員、全球荷士登乳牛聯盟(WHFF)會員、歐盟肉牛協會成員。

波蘭養牛產業團體協會的 2015 年 DHI 計畫涵蓋 20,101 戶酪農乳牛群 754,128 頭，占全國乳牛 2,247,785 頭之 33%，參加 DHI 戶數為全國 678,332 戶之 35.4%，DHI 乳牛的年產乳量為 7,582 公斤。波蘭養牛產業團體協會 DHI 資料顯示因有此協會設立，其 2006

年之 DHI 乳牛 520,666 頭的年產乳量僅是 6,664 公斤，近 10 年來，參加 DHI 的牛頭數成長 45%，乳牛產乳量也提高 14%之多。

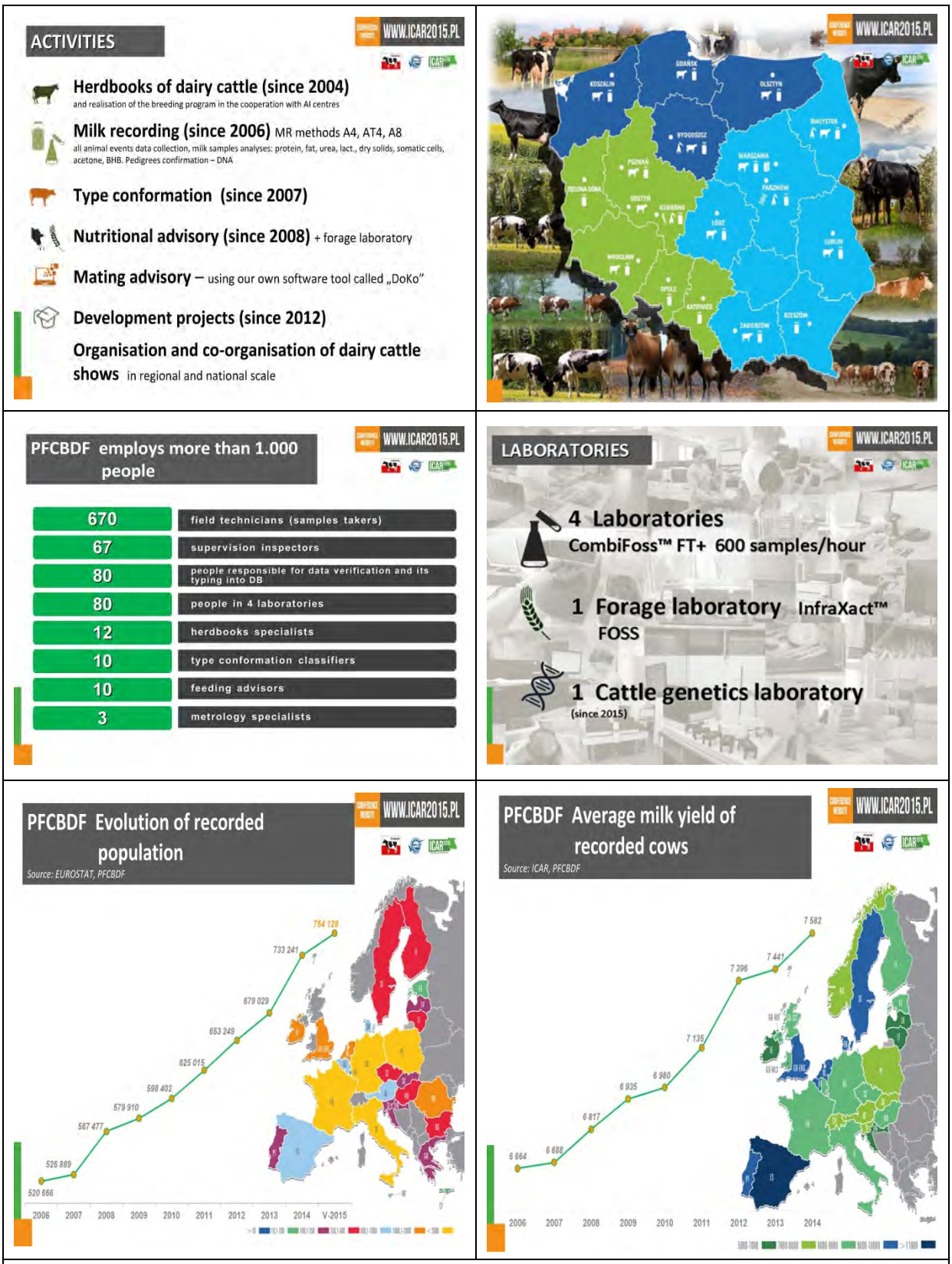


圖 14. 波蘭養牛產業團體協會的員工達 1,000 人之規模，並配合國家實驗室及乳肉品管理制度，設置檢驗服務實驗室或工作站

六、 ICAR 會員國 2015 年會重要結論

本次會議除著重乳樣的收集及探討動物健康課題蹄病防治等主題，在大會報告包括「我們可以從牛奶樣品中學習到什麼」，從各國乳牛群性能改良計畫(DHI)藉由乳樣分析多種檢測裝置及方式，有助於乳牛健康監測系統實施，利用傅立葉轉換紅外線光譜儀(FTIR)檢測乳成分中之酮體有助於乳牛健康監測與獸醫早期診療。來自世界各國學者專家報告「紀錄數據的諮詢服務」，並交換各國動物健康資料紀錄之規劃或其起步階段的經驗，過去費時費力的乳牛群繁殖性狀與疾病健康資料收集，已有自動紀錄裝置及專家決策系統可供酪農應用，如何由生產者農民、獸醫、資料處理員到消費者，農民藉由有組織系統的經整合過的國家型 (DHI) 資料庫之統計數據，可作為改善乳牛群飼養管理及治療管理之依據，以降低乳牛的淘汰率。為改善動物健康之必要措施，利用疾病的統計資訊，諸如蹄病跛行等牛隻外觀症狀、酮病代謝紊亂等監控數值，以達到農民預防勝於治療之策略。ICAR 非常重視各項資料收集及分析方法的品質保證措施，所以藉由國際工作會議進行標準化，各家廠商研發的先進收集資料的電子裝置和自動化傳輸系統有助於未來數據的整合，而與會的國家也都應有適合自己國情或地理環境的乳業解決方案。從過去勞力及紙本紀錄的傳統農業，大多數的農民已朝向透過資訊管理有關動物健康、繁殖與生產資料紀錄之整合應用，藉由資訊透明與即時傳輸諮詢服務，將促使動物飼養管理變革，漸進式的改變畜舍的軟硬體措施，以更符合動物福祉、食品安全和環境保護的世界潮流要求。ICAR 注重動物資料收集與分析方法的標準化，包括收集資料的電子裝置和自動化傳輸系統等，臺灣可引進相關儀器設施或參考借鏡，進而增進我國動物福祉及強化畜產品品質。

肆、建議事項

一、我國加入 ICAR 為會員國後，本年為第五年參加，不僅分享到 ICAR 資深國家在執行動物紀錄最新情況或最先進儀器與檢測方法，也漸導入國際規範於我國畜產動物生產計畫及管理制度中，可促進相關產業朝向資訊精準化經營轉型，提升國內動物生產品質。

二、我國也於 2014 年底成為 ICAR 轄下之乳質分析執行委員會 (Milk Analysis SC) 所主辦之國際乳質檢驗基準實驗室網絡(ICAR Reference Laboratory Network)之成員，而出席 2015 年 ICAR-RLN 成員會議。可參與精熟能力檢測計畫，並透過國際接軌來展示臺灣乳質分析精準可追溯性，使乳質分析比對具有國際接軌的能力，亦讓我國乳牛具有種原貿易價值及乳製品國際化之可能。

三、我國如能引進應用省時省工經營的自動感測裝置系統及機器人擠牛乳設施，學習 ICAR 年會暨科技會議之各國應用精準畜牧業發展知識與經驗，進行新一代的智慧型自動化經營規模轉型，有組織系統地把酪農、獸醫、資料處理員及消費端信息整合，讓酪農藉由國家型資料庫之統計數據，作為改善乳牛群飼養管理及治療管理之參據，以提高我國耐熱型乳牛的產乳年限及其乳品質。

伍、附錄

一、國際畜政聯盟會議活動及會議資料圖表

CONTENTS

PROGRAMME OVERVIEW

MONDAY, 8 JUNE 2015

- 1. ICAR Board + secretariat + SC + WG Chairpersons closed meeting — *Conference room: VAN GOGH I (level -1)*
- 2. INTERBEEF TC closed meeting — *Conference room: MONET (level 0)*
- 3. CoQ Auditors closed meeting — *Conference room: VAN GOGH III (level -1)*
- 1. ICAR Board closed meeting — *Conference room: VAN GOGH I (level -1)*
- 2. WG Breed Association closed meeting — *Conference room: MONET (level 0)*

Lunch for ICAR Board, WG SC members

TUESDAY, 9 JUNE 2015

- 1. WG INTERBEEF closed meeting — *Conference room: VAN GOGH I (level -1)*
- 2. S.C. Recording Devices meeting part II closed meeting — *Conference room: RENOIR III (level 0)*
- 3. WG Animal Data Exchange part II closed meeting — *Conference room: RENOIR I (level 0)*
- 4. S.C. Animal Identification meeting part II closed meeting — *Conference room: RENOIR IV (level 0)*
- 5. WG Genetic Analysis closed meeting — *Conference room: VAN GOGH III (level -1)*
- 6. WG Goat and Sheep recordingclosed meeting — *Conference room: VAN GOGH II (level -1)*
- 7. WG Conformation Recording closed meeting — *Conference room: MONET (level 0)*
- 1. WG Dairy Cattle Milk Recording closed meeting — *Conference room: RENOIR II (level 0)*
- 2. S.C. Recording Devices meeting part I closed meeting — *Conference room: RENOIR III (level 0)*
- 3. WG Animal Data Exchange part I closed meeting — *Conference room: RENOIR I (level 0)*
- 4. S.C. Animal Identification meeting part I closed meeting — *Conference room: RENOIR IV (level 0)*
- 5. WG Parentage Recording closed meeting — *Conference room: MONET (level 0)*

Lunch for ICAR Board, WG SC members

PRE-CONFERENCE MEETINGS & TOUR

Tuesday, 9 June 2015 - Technical tour to one of Milk Recording Organization Laboratories and Reference Milk Laboratory

WEDNESDAY, 10 JUNE 2015

Conference room: DEGAS (level -2)

- 7 –
- 8 – ICAR General Assembly + Extraordinary GA
- 9 – Welcome and presentation of Polish agriculture
- 10 – Health break
- 11 – Technical session I: What else can we learn from milk sample?
- 12 –
- 13 – Lunch
- 14 – Technical session II: Advisory services built on recording data
- 15 –
- 16 – Health break
- 17 – Technical session III: Manufacturers showcase
- 18 –
- 19 – Welcome cocktail at Krakow Town Hall

THURSDAY, 11 JUNE 2015

Conference room: DEGAS (level -2)

- 7 –
- 8 – Technical session IV: Milk recording in cattle, meat and fibre performance in sheep, goats and beef cattle.
- 9 –
- 10 – Health break
- 11 – Technical session V: Genomics at farm and phenotyping strategies
- 12 –
- 13 – Lunch
- 14 – Technical session VI: CoQ auditors' workshop
- 15 –
- 16 – Health break
- 17 – Technical session VII: Joint session
- 18 –
- 19 – Busses leave for Gala Dinner to Wieliczka Salt Mine

FRIDAY, 12 JUNE 2015

- 7 –
- 8 – Technical tours to the farms.
- 9 –
- 10 –
- 11 –
- 12 –
- 13 –
- 14 –
- 15 –
- 16 –
- 17 –
- 18 –
- 19 –

The technical tours will give you an opportunity to familiarize with Polish animal breeding in the conditions typical for southern Poland, including indigenous cattle breeds and production of traditional dairy products.

TOUR NUMBER I:

Dairy cattle of like indigenous dairy cattle breed: Red Polish at 2 family farms. Sheep, in the Polish mountain conditions along with demonstration of traditional production of "oscypek" – polish kind of mountain cheese with EU certificate of origin, produced from a mixture of sheep and cow milk.

TOUR NUMBER II:

Dairy cattle of different breeds like Polish Holstein and Jersey kept at 2 farms owned by a treasury state company SK Michałów Sp.z o.o. As an supplementary attraction, it is worth mentioning that this company is famous for its Arabian horses breeding. Beef cattle in family farms.

TOUR NUMBER III:

Dairy cattle in Polish farms characterized by a high level of milk production and having some additional branches of activity like a biogas plant or alcohol distillery etc.

DETAILED PROGRAMME

Organizers of animal recording systems have to keep improving their services. The ICAR Technical Workshop should be an important forum for exchange their experience. The intention is to have presentations on available applied technologies, which have in practical scale proven adequate functionality. The working title of ICAR 2015 workshops is:

PERFORMANCE RECORDING IN THE GENOTYPED WORLD

Therefore our intention is to be focused on the animal performance recording as a tool for breeders in every day farm management. A reliable performance recording is a basis for modern farm management, even in the genomics reality.

WEDNESDAY, 10 JUNE 2015

08:00 - 09:30 **ICAR General Assembly + Extraordinary GA**

09:30 - 10:00 **Welcome and presentation of Polish agriculture**

10:00 - 10:30 Health break

10:30 - 12:30 **Technical session I: What else can we learn from milk sample?**

Chairman: prof. Zygmunt Maciej Kowalski

- Global experience on ketosis screening by FTIR technology *(Daniel Schwarz)*
- New Milk Mid-FTIR Metrics For Dairy Cattle Management *(David Barbano)*
- Prediction of the risk of ketosis using mid infrared spectrometry. *(Marine Gelé)*
- Novel model of monitoring of subclinical ketosis in dairy herds in Poland based on monthly milk recording and estimation of ketone bodies in milk by FTIR spectroscopy *(Zygmunt Kowalski)*
- Experience of milk based farm monitoring of LPT Ltd. *(László Dégen)*
- Monitoring the mammary gland health status during lactating and drying off periods using Milk Amyloid A measurement in bovine milk. Applications: evaluation of mastitis treatment efficiency and prediction of the dry cow antibiotic therapy necessity. *(Cyril Crosson)*
- Pregnancy detection from milk samples obtained for routine milk yield measurements (Attila Monostori)
- Estimation of the prevalence of Subacute ruminal acidosis in dairy herds *(Romain Guegan)*

12:30 - 13:30 Lunch

13:30 - 15:30 **Technical session II: Advisory services built on recording data**

Chairman: Neil Petreny

- The advice organisation in dairy herds: Example in a Milk Recording Organisation from West of France *(Christophe Bruand)*
- Dirty Data the cause of an Emerging Disease in Cattle Farming. Is There Any Proof? *(Kristof Hermans)*
- Benchmarking in Dairy Production "How to transform data to valuable decision support" *(Johannes Frandsen)*
- Smart Dairy Farming: InfoBroker bases for Sharing Data and Chain Cooperation *(Pieter Hogewerf)*
- Operative Background of the Hungarian Farm Monitoring System Based on Milk and TMR Analyses *(Orsolya Petrák)*
- Web advisory tools to support dairy production in Slovenian herds *(Betka Logar)*
- SIEL WEB *(Quemener Stéphan)*
- On farm recording of fertility and health data using mobile devices *(Tomasz Strabel)*

15:30 - 16:00 Health break

16:00 - 18:00 **Technical session III: Manufacturers showcase**

Chairman: Martin Burke

- Update on the Implementation of ICAR Animal Data Exchange Standards *(Robert Fourdraine)*
- Experiences from routine checking and installation of milk meters with ICAR approved calibration software module from DeLaval *(Olle Selander)*
- Detection of Pregnancy-Associated Glycoproteins in Routine Milk Recording Samples *(Christoph Egli)*
- Blood BHB determination by infrared spectroscopy for the monitoring of the cows metabolic activity and detection of ketosis. *(Pierre Broutin)*
- MooMonitor+ Smart Sensing Technology & Big Data - Resting time as an indicator for welfare status on farms. *(Jiska Roessen)*
- AUTOPESEE, a French automatic weighing scales developed for the beef cattle performance recording *(Laurent Griffon)*
- Increasing the value and traceability of milk samples with NFC technology: SmartLY *(Eric Guemene)*

Parallel closed meeting:

Wednesday 10th of June 2015

- Reference Laboratory Network members meeting

The ICAR Milk Analysis Sub-Committee (ICAR MA SC) has organised a Reference Laboratory Network (RLN) meeting in conjunction with the ICAR annual meeting in Krakow 2015. The programme of the RLN meeting is both informative and exciting and will cover such interesting topics as: Quality Assurance for analytical parameters, Proficiency Testing in ICAR, National Laboratory Networks, Reference System for Somatic Cell Counting, work of the ICAR "Accuracy" Task Force, and a panel discussion on Trends and needs: the future of analytics in DHI.

The RLN meetings are closed sessions restricted only to the RL Network members. A summary of the RLN meeting in Krakow will be reported to the ICAR Technical Workshop participants on the 11th of June during the Joint Session at 16:00 in the Conference Room Degas (level -2)

19:00 **Welcome cocktail at Krakow Town Hall** (in a walking distance from the venue). For more details see the page 54.

THURSDAY, 11 JUNE 2015

08:00 - 10:00 **Technical session IV: Milk recording in cattle, meat and fibre performance in sheep, goats and beef cattle.**

Chairman: Laurent Journaux and Pavel Bucek

- Worldwide Trends in Milk Recording in Cattle *(Pavel Bucek)*
- Worldwide Trends in Milk Recording: Milk Recording and New Technologies *(Juho Kyntäjä)*
- World Trends in Milk Recording Management and Organization *(Karl Zottl)*
- Innovations in Sheep Performance Recording in New Zealand *(Andrew Cooke)*
- Organization of milk recording in goats in France *(Agnes Piacere)*
- Beef Data Recording in Ireland: Current Experience and Future Potential of an Industry Integrated National Database. *(Christopher Daly)*
- Implementation of new milk recording practises in Finland *(Heli Wahlroos)*

10:00 - 10:30 Health break

10:30 - 12:30 **Technical session V: Genomics at farm and phenotyping strategies**

Chairman: Mike Coffey

- Recording of claw and foot disorders in dairy cattle: current role and prospects of the international harmonization initiative of ICAR *(Christa Egger-Danner)*
- Efficient Cow - Strategies for on-farm collecting of phenotypes for efficiency traits *(Franz Steininger)*
- SNP selection for nationwide parentage verification and identification in beef and dairy cattle *(Matthew McClure)*
- Phenotypic associations and genetic correlations between claw health disorders and, milk production, fertility, somatic cell score and type traits in Holstein Spanish dairy cattle. *(Noureddine Charfeddine)*
- Guidelines to measure individual feed intake of dairy cows for genomic and genetic evaluations. *(Roel Veerkamp)*
- Maximizing Genetic Progress in the New Age of Genomics *(Robert Fourdraine)*

12:30 - 13:30 Lunch

13:30 - 15:30 **Technical session VI: CoQ auditors' workshop**

The Auditors' Workshop is intended to be an open meeting - everybody is welcome to attend it and the theme for the Workshop is: Data Quality for Genetic Evaluation, a topic that is important to most all ICAR members.

Chairman: Charl Hunlun

- COQ Auditors' Workshop *(Charl Hunlun)*
- Data requirements for management and breeding purposes in dairy cattle *(Friedrich Reinhardt)*

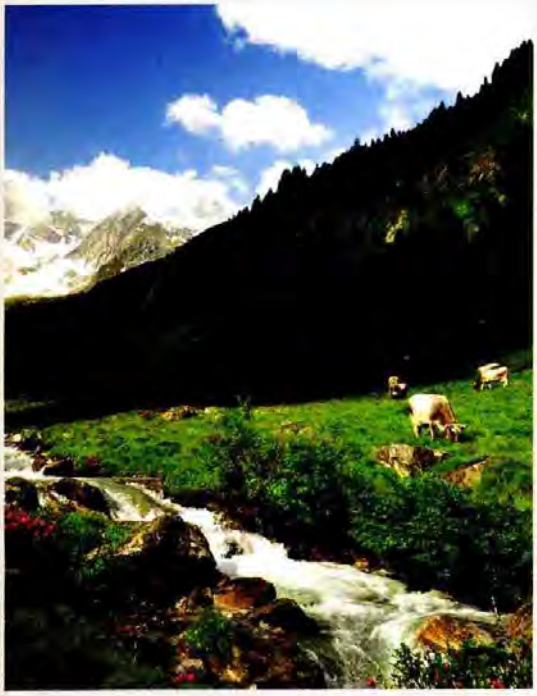
15:30 - 16:00 Health break

16:00 - 17:30 **Technical session VII: Joint session:**

A summary of all parallel meetings organized on following topics:

- Welfare and health - FIL/IDF SCAHW,
- Reference Laboratory Network
- Satellite workshop on the methods for survey and monitoring metabolic disorders, which are used by Milk Recording Organizations.

Chairman: Danuta Radzio



Parallel closed meetings:

Thursday 11th of June 2015

- Satellite workshop on the methods for survey and monitoring metabolic disorders, which are used by Milk Recording Organizations.

In order to facilitate sharing experience and ideas on new methods and factors useful for monitoring metabolic disorders of cows, the Polish organizer encouraged by prof. Zygmunt Maciej Kowalski came up with an idea to organise a small satellite workshop in the form of a brainstorming session. The number of participants is limited to 1-2 MROs' representatives /specialists from each country. The satellite workshop was intended as small parallel meeting of specialist acting in aforementioned field. Therefore the outcomes of this meeting will be reported to the all ICAR Technical Workshop in Krakow participants on the 11th of June during the Joint Session at 16:00 in the Conference Room Degas (level -2)

- Meeting of the IDF Standing Committee on Animal Health and Welfare (SCAHW) experts.

The experts have been nominated by IDF's National Committees to serve on this committee.

The overall objective of the IDF SCAHW is to inform the dairy sector about new developments in the field of animal health and animal welfare and their implications on prevention of diseases considering aspects relating to farm economics, food safety, human health and dairy technology.

The IDF Standing Committee meetings are closed meetings and any observers need to be cleared prior to the meeting through our National Committees. Therefore the outcomes of SCAHW meeting in Krakow will be reported to the all ICAR Technical Workshop in Krakow participants on the 11th of June during the Joint Session at 16:00 in the Conference Room Degas (level -2)

18:00 Busses leave for **Gala Dinner at Wieliczka Salt Mine.** For more details see the page 55.

PRE-CONFERENCE TOUR – VISIT TO THE LABORATORIES ON THE 9TH OF JUNE 2015:

MILK LABORATORY OF KCHZ, REFERENCE LABORATORY IN PARZNIEW (LOM KCHZ-LR)

Refrence Milk Laboratory of Krajowe Centrum Hodowli Zwierząt in Parzniew, is by law the reference laboratory for fat evaluation.

The laboratory prepares reference materials for laboratories which evaluate raw milk: reference samples and sets of calibration samples. The reference methods are used for this purpose.

It organises also ring tests for fat evaluation based on standards PN-EN ISO/IEC 17043:2011 "Conformity assessment – General requirements for proficiency testing" and ISO 13528:2005 „Statistical methods for use in proficiency testing by interlaboratory comparisons".

Additionally the lab provides dairy plants testing bulk milk with services for microbiological and physic-chemical traits as well as makes tests, checking the presence of inhibitors and antibiotics in milk. For aforementioned services instrumental methods are used.

Quality assurance system based on PN-EN ISO/IEC 17025:2005 "General requirements for the competence of testing and calibration laboratories" is running. Laboratory is accredited by the Polish Centre for Accreditation and has received the ICAR Certificate of Quality for reference laboratory.

Using reference methods 1.275 tests for fat, protein, dry matter and freezing point were carried out in 2014. At the same time 6.620 reference milk sets and 1251 chemical composition, freezing point, urea level, SCC and total bacteria calibration sets ware prepared and distributed. Additionally, 685 sets of tests for laboratories participating in ring tests were prepared.

In the year 2014, the laboratory performed about 200 thousand tests, as services for dairy plants, including about 100 thousand tests for protein, fat, lactose, dry matter, urea level and SCC, nearly 90 thousand tests for total bacteria in bulk milk and about 7,6 thousand tests for presence of inhibitors and antibiotics in milk.

In 2014 Laboratory participated in 134 ring tests for 22 different parameters. National ring tests were organised by the Laboratory of the National Veterinary Research Institute in Puławy, LOM KCHZ –LR (national ring tests) and international ring tests were organised by ICAR and CECALAIT. LOM KCHZ-LR received positive results in all abovementioned tests.

PFHBIPM MILK LABORATORY LOCATED IN PARZNIEW

Four milk laboratories operate within Polish Federation of Cattle Breeders and Dairy Farmers services, each of them covers a specific area as follows:

RECORDING REGION IN PARZNIEW

- Laboratory in Białymstok located in Jeżewo Stare – Podlaskie voivodeship action area,
- Laboratory in Parzniew – Mazowieckie, Lubelskie, Łódzkie, Małopolskie, Podkarpackie i Świętokrzyskie voivodeships action area – the lab hosting the visit.

RECORDING REGION IN POZNAŃ

- Laboratory in Kobierno – Lubuskie, Wielkopolskie, Dolnośląskie, Opolskie i Śląskie voivodeships action area,

RECORDING REGION IN BYDGOSZCZ

- Laboratory in Bydgoszcz located in Minikowo – Kujawsko-pomorskie, Pomorskie, Warmińsko – mazurskie i Zachodniopomorskie voivodeships action area.

PFCBDF's laboratories realise milk composition analyses, based on analytical standards PN-ISO 9622:2006 i PN-EN ISO 13366-2:2007. For milk recording purposes laboratories determine percentage of: fat, protein, lactose, dry solids, urea level and somatic cells number.
Over 7 million samples is analysed for the above mentioned parameters in our laboratories yearly, which gives the average increase in the number of performed tests by almost 10% in comparison to 2013. Laboratory in Parzniew makes over 2 million out of above mentioned 7 million analyses yearly.
Laboratories work in accordance with PN-EN ISO/IEC 17025:2005 standard requirements in terms of milk analysis, which guarantees:

- reliability of the measurements,
- objectivity
- independence
- accuracy of testing and measuring devices,
- the use of standardized test methods
- the principles of traceability,
- highly qualified personnel.

All analyses are consistent of national and international standards i.e.:

- use reference materials purchased in the Reference Laboratory of National Animal Breeding Center in Parzniew (also visited during the tour) and Laboratory A.I.A, Italy.
- participate in national and international proficiency tests organized by the Reference Laboratories present on the List of Reference Laboratories issued by the ICAR.

PCA
AB 470
AB 472
AB 473
AB 822

Granting accreditation certificates by the Polish Centre for Accreditation for the subsequent period is the confirmation of the aforementioned standards. Accreditation certificates were granted to the following laboratories:

- Laboratory in Białymstok located in Jeżewo Stare AB 472
- Laboratory in Parzniewie AB 822
- Laboratory in Kobierno AB 470
- Laboratory in Bydgoszcz located in Minikowo AB 473

For more information see PCA website: www.pca.gov.pl testing laboratories chapter

CATTLE GENETICS LABORATORY

Early in 2015, on February 27th, the Cattle Genetics Laboratory was opened in Parzniew. It is a new investment of Polish Federation of Cattle Breeders and Dairy Farmers, reflecting the needs of the Polish breeders in the field of cattle genetics and dedicated to owner of Holsteins cattle associated in our organization. This new service is providing by order of breeders and it is focused on reliable, fast and cheap information about

genetic features of animals. After the evaluation breeders receive results of GEBV contains 8 indices and 32 traits completed on a sheet for every individual animal. Breeders can use those results for:

- Selection heifers for replacement in herd;
- Selection candidates for embryo transfer;
- Very precise mating plan;
- Selection females for selling.

Laboratory facilities are placed in two specially prepared areas and are equipped with automatic system of DNA extraction, two PCR cabinets and microarray scanner iScan with Autoloader 2.x delivered by Illumina.
Our laboratory is working mainly with EuroG10k_Pol BeadChip but analysis with Bovine 50K BeadChips are also available. Laboratory's team consist of 3 young scientist specializing in animal genetics and transcriptomics. During the period between February 27th and April 13th, 1344 samples were processed, with effectiveness of over 99% (call rate over 95%).
The laboratory's performances are expected to generate output sufficient to provide services to the whole Polish bovine population. In the near future we expect to record genotypic sequence of 1-2% active female population annually, furthermore we plan to employ additional features offered by EuroG10k_Pol chips, namely analysis of recessives genes in context of hereditary diseases as well as parental verification.

TECHNICAL TOUR NUMBER I

FAMILY DAIRY FARM OF MARIAN KRAUS

Staff
The family only (3 people).

Location
Podsarnie 6a, Małopolskie voivodship – 85 km South from Krakow. Mountain area.

Company profile
Milk production mainly. Milk is supplied to regional dairy cooperative OSM Radomsko. According to the farmer's words, "the farm has been existing and producing for ever". It is an example of traditional cattle breeding in the mountains using a breed of cattle well adapted to the mountain conditions and poor forage resources.

Animal Production

Herd size (av. 2014)	20 cows (Polish Red) 10 calves
Annual milk yield (av. 2014)	5 605 kg of milk, 3,91% of fat, 3,30% of protein,
Calving interval	373 days

Crop Production
30 ha farmland (therein 20 ha rented)
20 ha of pastures and meadows
10 ha of oat, wheat and barley

Barn characteristics and housing system
The cows are kept in a barn with tying stalls, enlarged and adapted according to the possibilities. There are plans to modernize the barn towards loose boxes, with a milking parlour and to increase the herd up to 50 Polish Red cows.
Semen of Danish bulls was used for matings. Polish Red cows are characterised by longevity, in this particular herd there are cows which produce even during 11 lactations. Cows graze from the end of May till October, grass silage is the basic fodder throughout the year.
Marian Kraus and his son regularly participate in Regional Animal Shows with their cows and are praised for the results achieved in breeding Polish Red cows.

FAMILY DAIRY FARM OF FRANCISZEK STOCH

Staff
the family only (3 people).

Location
Załuczne 101a, Małopolskie voivodship – 90 km South from Krakow. Mountain area.

Company profile
Milk production mainly. Milk is supplied to dairy cooperative SM Mlekovita – processing site in Zakopane.
It is an example of a traditional small mountain dairy farm, run by following generations in a row. Our today's hosts took over the farm in 1988 from their parents. The barn was built in 1997. The farms operates within the Programme of Farm Animal Genetic Resources Protection, financially supported by the Ministry of Agriculture. The aim of this programme is to save native breeds which are less productive but more robust, healthy and perfectly adapted to the difficult mountain conditions and scarce forage resources.

Animal Production

Herd size (av. 2014)	20 cows (Polish Red) 20 calves
Annual milk yield (av. 2014)	3 635 kg of milk, 4,03% of fat, 3,21% of protein,
Calving interval	359 days

Crop Production
30 ha farmland (therein 20 ha rented)
25 ha of pastures and meadows
5 ha of oat and triticale

Barn characteristics and housing system
The cows are kept in a barn with tying stalls, built in 1997. Today the owner claims, that the barn is too small and limits development. Semen only from Polish Red selected bulls can be used in this farm, according to the Programme of Genetic Recourses Protection.
Polish Red cows are characterised by longevity, in this particular herd there are cows which produce even during 11 lactations. Cows graze from the end of May till October, grass silage is the basic fodder throughout the year.

SHEEP + POLISH RED COWS FARM ON THE MOUNTAIN PASTURE. ANDRZEJ ZUBEK

Location

Dursztyn – mountain pastures - beneath "Twarda Skała"

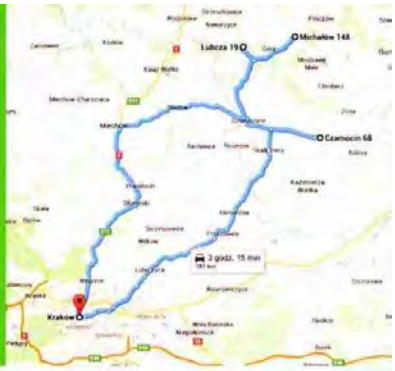
Andrzej Zubek is a senior shepherd (BACA) of long experience and with the tradition going back several generations. He lives in Ratułów in Czarny Dunajec commune where he keeps 10 Red Polish cows (av. milk yield 4.024 kg). In summer he grazes his cows together with about 700 sheep in Dursztyn. He has been a senior shepherd for many years, and has taken over this tradition from his father and grandfather. He says that sheep grazing is the greatest passion of his life. He produces delicious oscypek cheese which fully meets the EU standards.

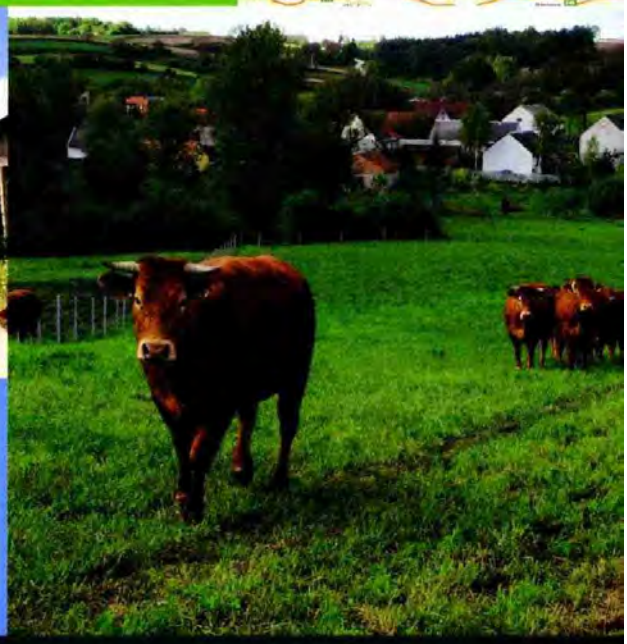
Sheep and oscypek cheese

The history of Tatra shepherding has intertwined with Eastern Carpathians. It is the place to which the Wallachian tribes came from Transylvania all the way to Podhale at the turn of the 14th century. Their folk customs dominated the culture of local inhabitants, who, whether they liked it or not, also adopted the shepherding system of the comers. The sheep are the pride of every highlander today. A real "baca" - the senior shepherd in Tatras, does not spend his summer in a comfortable bed but in his hut among the mountain pastures and Tatra peaks. Oscypek cheese, that is hard sheep cheese made mainly in Podhale, as well as żentyca drink were long ago used by "gazda" - Tatra farmer, and "baca" as well as by "baca" and "juhas" - the young shepherd, to settle accounts with each other. Today these products are the greatest achievements of the highlanders.

Oscypek, Oszczypek (Polish; plural: oscypki) is a smoked cheese made of salted sheep milk exclusively in the Tatra Mountains region of Poland. Since 2007 Oscypek is a protected trade name under the EU's Protected Designation of Origin geographical indication. Oscypek is made using salted sheep's milk, with the addition of cows' milk, their proportion are strictly regulated by the protected recipe. Unpasteurized salted sheep's milk is first turned into cottage cheese, which is then repeatedly rinsed with boiling water and squeezed. After this, the mass is pressed into wooden, spindle-shaped forms in decorative shapes. The forms are then placed in a brine-filled barrel for a night or two, after which they are placed close to the roof in a special wooden hut and cured in hot smoke for up to 14 days.
The first mention of cheese production in the Tatra Mountains dates back to the 15th century, in a document from the village of Ochotnica in 1416.
There is also a smaller form called redykołka, known as the 'younger sister' of oscypek.

TECHNICAL TOUR NUMBER II





FAMILY BEEF FARM OF KATARZYNA AND MIKOŁAJ SAMBÓR

Staff
the family only with seasonal workers in vegetable production.

Location
Czarnocin 68 – 65 km Nord Krakow, Świętokrzyskie voivodeship.

Company profile
Agricultural operation with developing beef production. Family started their beef breeding in 2011 buying 7 Limousine heifers. Today vegetable production and pork production constitutes quite an important source of income. The cattle is bought by a small local slaughterhouse, which processes meat and sells their products on the spot.

Animal Production

Herd size	15 cows (Limousine) 10 calves
Live weight gain	♂ 1200 -1300 ♀ 900 - 1100
Pork	up to 100 porkers / year

Crop Production
51 ha farm land (therein 30 ha rented)
10 ha of barley
8 ha of wheat
2 ha of triticale
2 ha of corn for silage
4 ha of parsley
8 ha of sugar beet
17 ha of grassland
Cows are fed with corn silage, beetpulp and hey ad libitum during winter. There is a period of grazing from end of April till October.

Barn characteristics and housing system:
The cows are kept in two sheds. There are plans to construct a new one. The family plans to increase their herd up to 30 cows in the nearest future. Almost all crop production is used at the farm for beef and pork.

TWO DAIRY FARMS MANAGED BY STADNINA KONI MICHAŁÓW SP. Z O.O. (MICHAŁÓW STUD).

Michałów Stud is subjected to the Agriculture Property Agency in Warsaw. Michałów first of all is worldwide famous for breeding purebred Arabian horses with over 60 years of tradition. Today it keeps about 400 Arabian horses therein120 mares.

Location

Michałów is situated in Świętokrzyskie voievodship, just 45 km South from Kielce, 230 km South from Warsaw and 100 km North from Krakow.
Michałów is well known for the Stud's characteristic white stone stables, built in 1960's from limestone quarried in nearby Pińczów. Built together in a compact, well-designed unit, these stables are ideally suited for horse breeding. As a result of its unique valley location, Michałów enjoys a very specific microclimate, with low annual rainfall, shallow topsoil, high soil calcium levels and dry, arid conditions perfect for the maturation of hay and pasture - in other words, as near to authentic desert conditions as it is possible in Europe necessary for raising Arabian horses. Michałów also breeds rare Appaloosa (leopard) - patterned Malopolska sport horses, as well as a small group of Shetland ponies. There have been 150 stallions from 13 sire strains used during Michałów Stud 62 years of Arabians' breeding. Top most Michałów's mares have their origin in 11 female strains. There were 3346 Arabian purebred foals born. Stud sold more than 1.500 Arabian horses to Australia, North America, South America, Africa, Asia and Europe, with the highest achieved price for Kwestura mare, who was sold to the United Arab Emirates for EUR 1.125.000 !!!! in 2008.
Next to Arabians' breeding SK Michałów keeps 2 dairy farms one with Holstein-Friesian cows and the second with Jersey cows.

Crop Production:

The overall area of the Michałów Stud is 639 ha, therein:
620 ha of farmland therein
95 ha of pastures
107 ha of meadows
418 ha of arable lands therein:
215 ha for oat, wheat, triticale and barley
140 ha for corn
63 ha for alfalfa - 2 last crop productions for cows' fodder as silage.
The land is mainly limestone soil of marl subsoil, rich in limestone and other mineral components.

Staff:

48 employees, therein 38 in animal and crop production and 10 in administration and the office.

LUBCZA

Location
Holstein-Friesian cattle herd located in Lubcza

Company profile
Dairy farm.

Animal Production

Herd size (av. 2014)	190 milking cows (Holstein-Friesian) 200 calves and heifers
Annual milk yield (av. 2014)	10 757 kg of milk, 3,95% of fat, 3,33% of protein,
Calving interval	447 days

Yearly milk production in 2014
1.829.489 litres of milk supplied to regional dairy cooperative OSM Włoszczowa

Milking parlour
herringbone 2x9 GEA Metatron MB

The farm in Lubcza has been functioning within SK Michałów structures since 1961 and from the very beginning has been in milk recording. In the a farm top crossbreeding had been running in the very beginning, using imported semen of Holstein bulls towards Holstein cattle (HO and RW). The basis for top crossbreeding was Michłów's herd of the local lowland black-white dairy cattle

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MICHAŁÓW

Location
Jersey cattle herd located in Michałów

Company profile
Dairy farm.

Animal Production

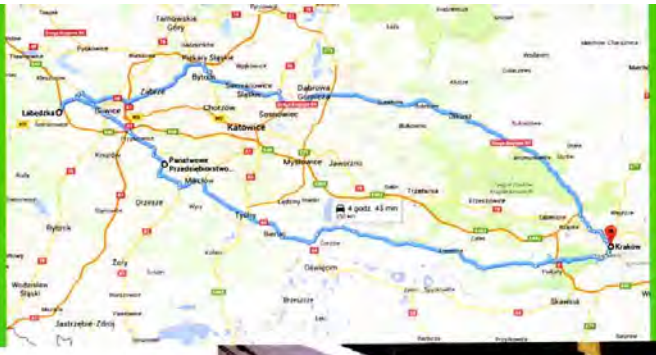
Herd size (av. 2014)	130 milking cows (Jersey) 150 calves and heifers
Annual milk yield (av. 2014)	7687 kg of milk, 5,27% of fat, 3,94% of protein,
Calving interval	408 days

Yearly milk production in 2014
963.534 litres of milk supplied to regional dairy cooperative OSM Włoszczowa

Milking parlour
herringbone 2x4 GEA Metatron MB

The farm in Michałów has been functioning within SK Michałów structures since 1950 and from the very beginning has been in milk recording. The local lowland black and white dairy cattle had been bred there in the very beginning. The first Jersey cattle had been bought in other Polish farms in 1986, then 2 years later the first 30 followed by next 15 jersey heifers in calf were imported from Denmark.

TECHNICAL TOUR NUMBER III



TWO BIG DAIRY FARMS SPECIALISED IN MILK PRODUCTION. BOTH FARMS WERE PRIVATISED 20 YEARS AGO. PREVIOUSLY THEY WERE STATE FARMS.

BUTOR GROUP

3 generations of farm owners: Władysław and Krystyna Butor, Bożena Butor-Fleszar with her husband Krzysztof Fleszar and their son Mateusz Fleszar.

Staff
90 employees.

Location
Łany Wielkie, ul. Łabędzka 54 – 120 km West from Krakow, or 40 km West from Katowice. Silesia region is famous rather for hard coalmines than animal production.

Company profile:
Dairy farm with alternative sources of income like: biogas plant, alcohol distillery and rapeseed oil processing plant.

Animal Production

Herd size (av. 2014)	398 milking cows (Holstein-Friesian) 500 calves and heifers
Annual milk yield (av. 2014)	11 625 kg of milk, 3,69% of fat, 3,33% of protein,
Calving interval	447 days
Culling rate	25%

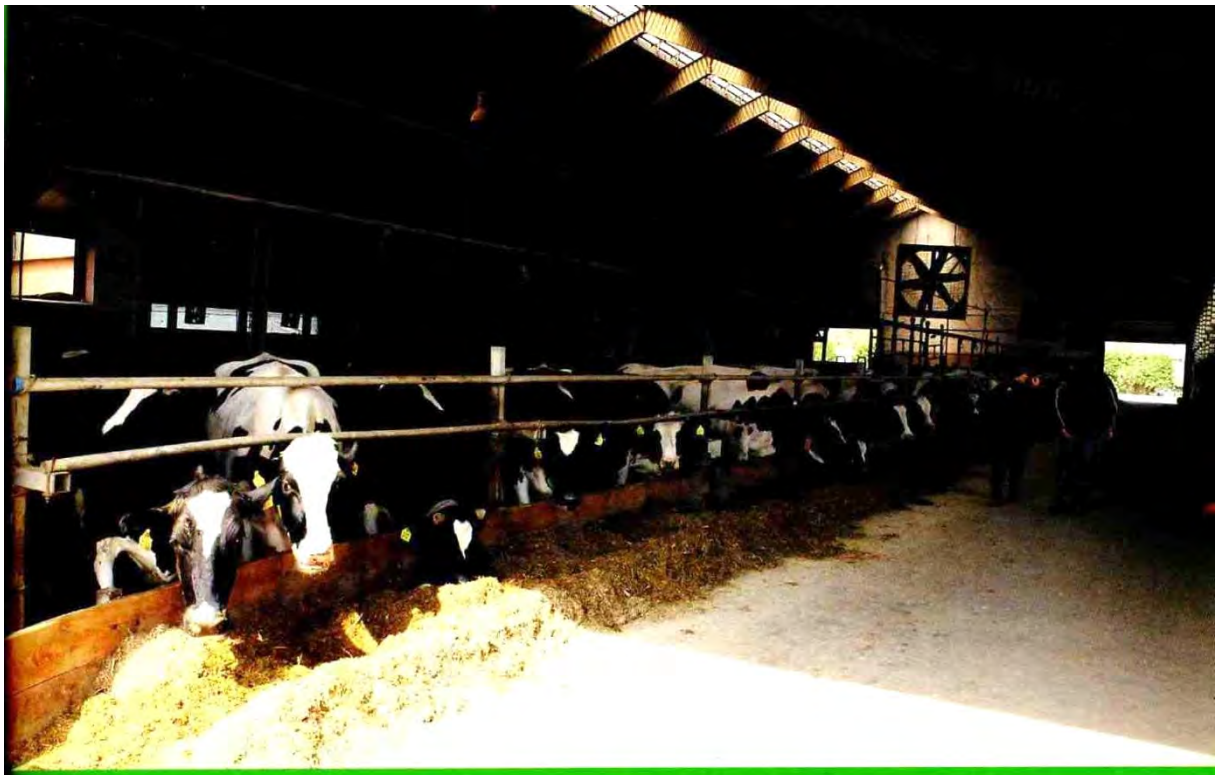
Surplus heifers in calf are sold being an additional source of income.

There are 2 cows in this herd with lifetime production exceeding 100 000 kg of milk, one of them is still producing.

Crop Production
1400 ha farmland, therein:
700 ha of corn for silage
300 ha of rape for oil
400 ha of cereals therein: winter wheat, barley and alfalfa.
Corn is also used as fuel for the biogas plant as well as raw ingredient for the distillery. The farm runs a certified seed production of cereals.

Barn characteristics and housing system:
The cows are kept in a loose barn on a bedding., the excrements out of which are due for the biogas plant. The solid part of leftovers from the fermentation process is re-used as bedding while the liquid part is used for fertilization of the arable land and grasslands, which covers 50% of soil demands. The fertilization level is adapted to the soil richness.
The biogas plant produces electricity for the farm and the heat generated in the process is used in the distillery.
Cows are fed with TMR different rations for different groups. There is no grazing except for heifers.

Milking parlour:
herringbone 2x12.



MAREK BŁASZCZYK

Staff:
20 employees.

Location:
Mikołów, ul. Przelotowa 7 – 100 km West from Krakow, or 20 km West from Katowice. Silesia region is famous rather for hard coalmines than animal production. Being the state farm before 1994, the farm together with other state farms in the region created the so called "milk ring" for Katowice agglomeration.

Company profile:
Agricultural operation with milk production, additionally a new activity: fish ponds for carp production (about 5 ha area).

Animal Production

Herd size (av. 2014)	255 milking cows (Holstein-Friesian) 100 heifer calves 70 bull calves from own breeding, fattened until 20 months age at the weight about 560 kg
Annual milk yield (av. 2014)	9580 kg of milk, 3,71% of fat, 3,32% of protein,
Calving interval	466 days
Culling rate	24%

Crop Production
1800 ha farm land
1000 ha of cereals therein: winter and spring wheat.
400 ha of rape for oil
150 ha of corn for silage
80 ha grassland for silage
5 ha of alfalfa
25 ha of potato
The farm runs certified seed production of wheat and potato.
Cows are fed with TMR different rations for different groups. There is no grazing. Wet brewer's grain and molasses are used for TMR rations.

Barn characteristics and housing system:
The cows are kept in a loose barn. Old buildings are consequently adapted to current demands. Recently a new calf shed has been constructed, equipped with automatic calf feeder.

Milking parlour:
tandem for 12 boxes

Installation of a milking robot is planned for the future due to shortage of hands especially for cows' milking.

二、國際乳質檢驗基準實驗室網絡專家群及成員會議資料

Martin Burke, Ireland, milk recording, recording devices and quality systems (召集人)
Kees de Koning, Netherlands, recording device testing, and statistical systems.
Albert de Vries, USA, precision systems, research and management information
Bevin Harris, New Zealand, statistics, animal breeding and recording systems
Esa Mäntysaari, Finland, statistics, animal breeding and research
Filippo Miglior, Canada, milk recording, research and animal breeding
Harrie van den Bijgaart, Netherlands, milk analysis, milk recording and analytical systems
Joel Weller, Israel, statistics, economics, research and animal breeding
Brian Wickham, Ireland, Convenor
Karl Zottl, Austria. Field use of quality data

Summary of the Reference Laboratory Network (RLN) meeting

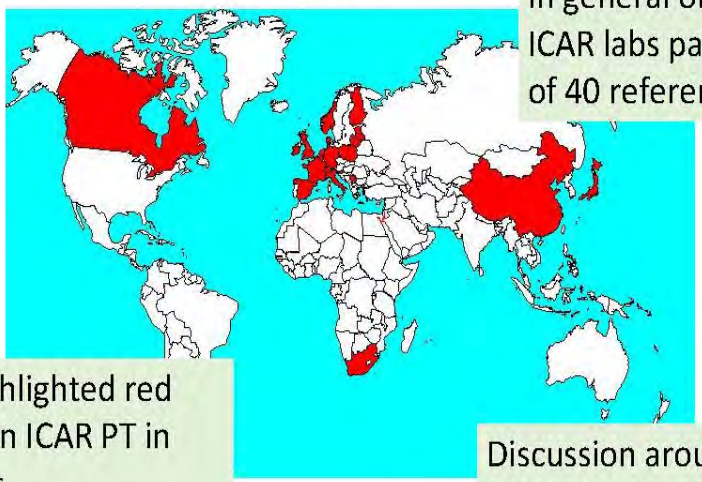
Krakow 2015

Presentations

- Accuracy Task Force Interim Report (Brian WICKHAM)
- Proficiency Testing in ICAR – History and present situation (Philippe TROSSAT)
- Example of a National Laboratory Network – Germany (Thomas HAUCK)
- IDF/ICAR project "Reference System for Somatic Cell Counting" (Harrie VAN DEN BIJGAART)
- Optimir standardisation of MIR instruments (Clément GRELET)

Proficiency Testing in ICAR – History and present situation

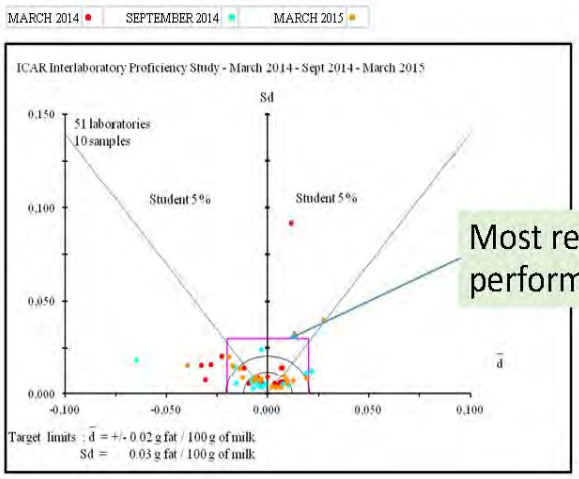
In general only around 50% ICAR labs participate (20 out of 40 reference labs)



Countries highlighted red participated in ICAR PT in last few years

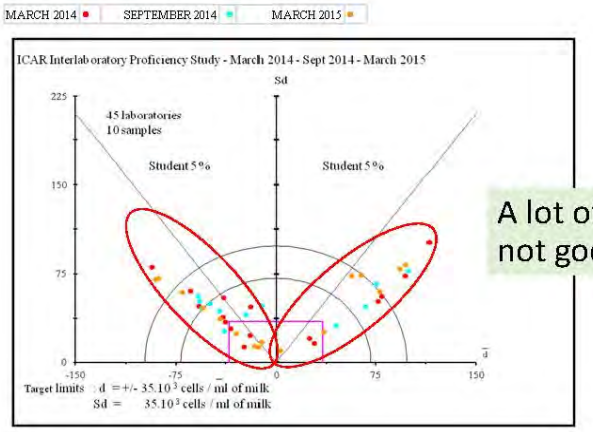
Discussion around how we can improve participation

RG Fat example



Most results in box = good performance

Somatic Cells



A lot of results outside box = not good equivalence

IDF/ICAR project "Reference System for Somatic Cell Counting"

On the Road to Better Global Equivalence in Somatic Cell Counting

IDF/ICAR Project Group on
Reference System for Somatic Cell Counting

Project leader: Harrie van den Bijgaart
(bijgaart@qlip.nl)

Somatic cell counting

Defining method (DMSCC)
(ISO 13366-1|IDF 148-1)

+ Direct microscopic count
- Analyte poorly defined
- Laborious, cumbersome
- Requires well-trained analysts
- Poor precision

Routine methods
(ISO 13366-2|IDF 148-2)

+ Automated, user-friendly
+ High throughput
+ High precision
- Needs reference

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Precision DMSCC vs routine methods

	Mean	sr	sR	r	R
Reference	245	38	41	107	114
	679	69	79	192	218
Routine	245	13	20	36	57
	679	21	40	59	112

All values in '000/mL

Source: ISO 13366-1/2|IDF 148-1/2

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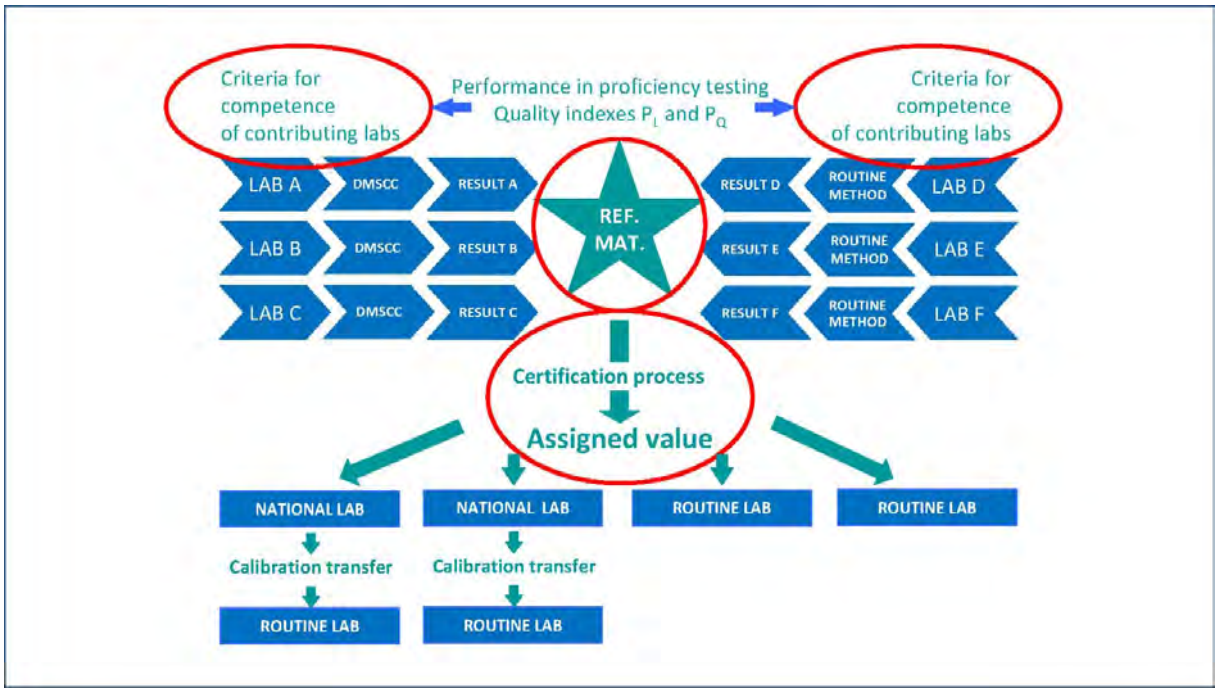

Progress (1)

- Created much awareness about the project through publications, presentations, newsletters, website www.fil-idf.org/RSSCC
- 3 Questionnaires in 2010 to 2013
  - Reference material providers and organizers of proficiency testing
  - QA and anchoring in routine laboratories (214 replies)
  - Interest in certified reference materials (141 replies)
- Identified interlinkages between labs worldwide through use of secondary reference materials and participation in proficiency testing

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Progress (2)

- Guidelines for preparation of reference materials, see IDF Bulletin 469/2013
- Optimized procedure for preparation of reference materials
- Publication on 'Evaluation on proficiency tests and laboratory performance through quality indexes' (close to submission)
- Following work in ISO/TC 276 Biotechnology on Cell Counting

  Part 1: General guidance on cell counting methods

  Part 2: Experimental design and statistical analysis to quantify counting method performance

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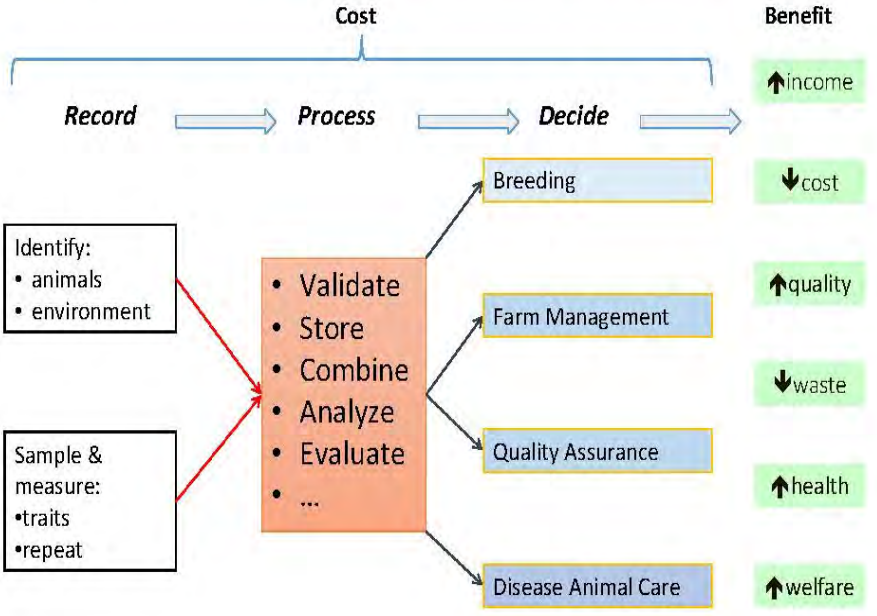
Recording – Costs & Benefits



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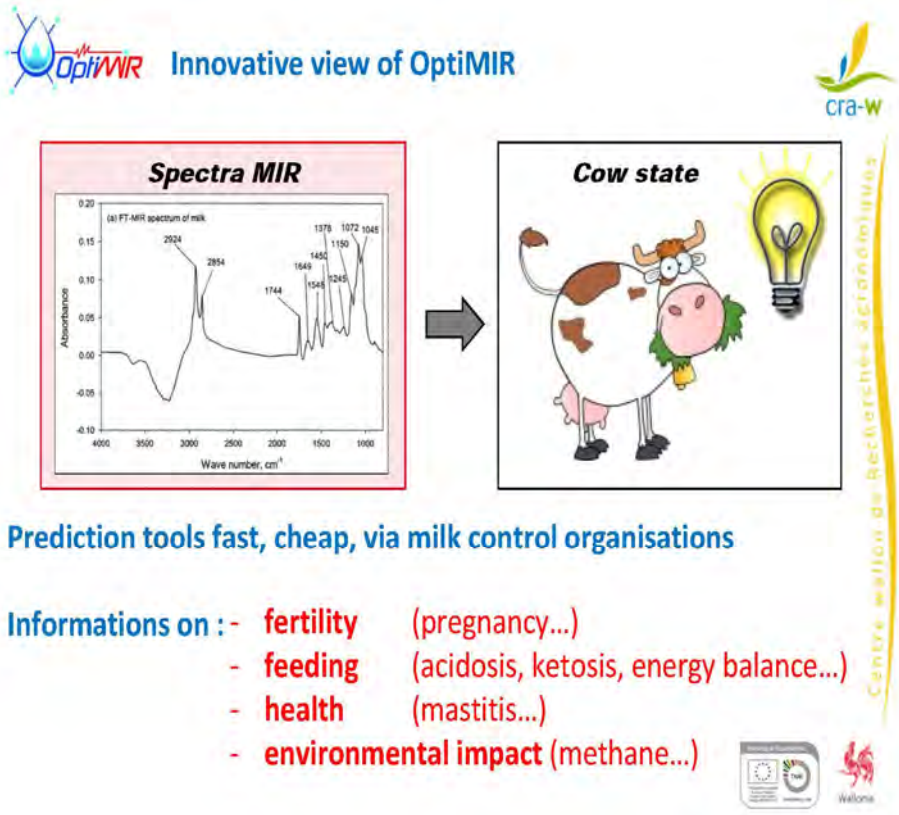
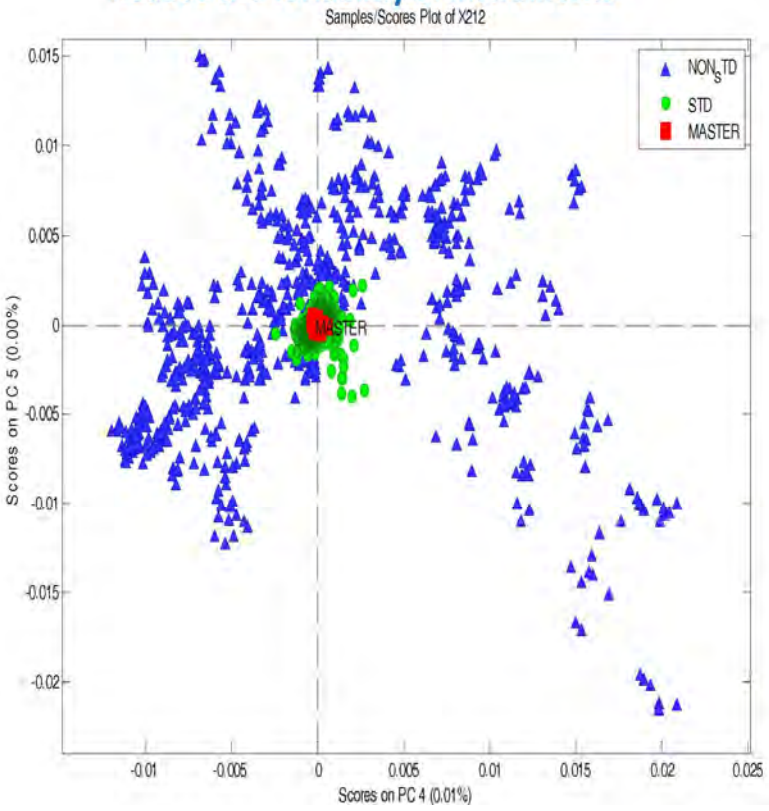


Quality management

- All DLQ labs are accredited according to DIN EN ISO/IEC 17025.
- All labs are certified according to ICAR CoQ.
- Proficiency tests
  - Internal: automatically monitoring of routine testing by internal reference material.
  - National: periodic validation of results concerning all analyzed components by participation in proficiency test.
  - Single DLQ labs participate in international proficiency tests. By taking part in national proficiency tests all labs benefit from constructed network.

Laboratory network of Germany – DLQ

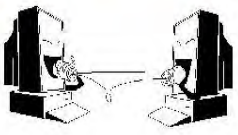
Reduce the variability of instruments



Conclusion

Common langage for all instruments

- ✓ Monthly since january 2012, 67 instruments into 27 labs
- ✓ Increasing network
- ✓ Merging database
- ✓ Creation of common models, more robust
- ✓ Use of the models by all instruments



→ Equations become universal

Standardisation of milk mid-infrared spectra from a European dairy network,
C. Grelet, J.A. Fernández Pierna, P. Dardenne, V. Baeten, F. Dehareng,
Journal of Dairy Sciences, 2015, 98 :2150–2160