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### 86. 乳牛場分犊牛舍立體空間聲紋收集系統之應用

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#### 86. 乳牛場分犊牛舍立體空間聲紋收集系統之應用

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酪農業的生乳生產是由泌乳牛隻每日擠乳所貢獻，泌乳牛必須持續配種生產仔牛來維持每日的泌乳生產，所產仔牛亦是延續生乳製造重要一環。目前在深夜時段，酪農戶以排班巡視方式來減少母牛深夜難產的情形。因此懷孕母牛的分犊監測及接生照護是酪農業重要的管理環節，亦是相當仰賴人力的投入。本研究研發全向式收音箱裝設於分犊牛舍立體空間，收音範圍為半徑 10 公尺，並其備基本液體滲透及固態微粒防護等級(IP54)。系統在每日的夜晚到凌晨時段收集錄製牛隻的叫聲聲紋，以特殊技術過濾人聲、抽風扇、飛機、頸夾及大型機具的噪音。所收集的聲紋檔，透過 Wi-Fi 無線網路及網際網路傳送到生乳數據平台的資料庫，並以 MQTT Broker 進行資訊溝通。系統提供 RWD 網頁及行動裝置 APP 給使用者設定參數及存取聲紋檔，作為分析牛隻分犊行為聲紋辨識之用途。

關鍵語：乳牛場、分犊、聲紋

Applying voice collecting system in the stereoscopic space of dairy farm

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The production of raw milk in dairy farming is contributed by the daily milking cows. Lactating cows must continue to breed and produce calves to maintain daily lactation production. These calves are also an important part of the continuous production of raw milk. At present, dairy farmers patrols by turns to reduce dystocia situation of cows in the midnight. Therefore, the childbirth monitoring and care of pregnant cows is an important management part in dairy farming. It also relies heavily on manpower. This research develops the omnidirectional receiver installed in stereoscopic space of the childbirth cowshed. The system records the sound of cows during the midnight and uses special techniques to filter the noise of vocals, fans, airplanes, neck clips and large machines. The system provides the RWD website and mobile device application to set parameters and access the voice files for the user to use as the voiceprint identification for analyzing the behavior of childbirth.

Key Words: Dairy farm, Childbirth, Voice

## 88.種豬拍賣承購價影響因素之探討

### 88.種豬拍賣承購價影響因素之探討

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本試驗目的為探討純種豬檢定之選拔指數、體型及腳蹄之名次是否亦影響種豬拍賣承購價。試驗豬隻為自 2011 年 3 月 23 日至 2019 年 5 月 22 日期間，在中央檢定站於各期完檢後之選拔指數合格名次之杜洛克與藍瑞斯公豬，共 2,973 頭。純種豬檢定指數 100 以上進行體型評鑑，入選共 824 頭；分品種分性別體型評鑑有入選 2 頭（含）以上再進行腳蹄評分，入選共 351 頭。每個項目依照名次分成三組，再應用 Pearson 簡單相關性及 t-test 分析比較對種豬拍賣承購價影響程度。試驗結果如下：(1) 杜洛克與藍瑞斯公豬種豬拍賣承購價對體型、指數及腳蹄的 Pearson 簡單相關係數分別為 -0.15 與 -0.20，-0.39 與 -0.32 及 -0.21 與 -0.148。(2) 純種豬檢定指數名次優者的拍賣承購價顯著高於次優及差者，本研究結果顯示種豬拍賣承購者願意對種豬性能好的杜洛克與藍瑞斯公豬出高價購買。

關鍵語：種豬、承購價、影響因素

Study on the factors affecting the purchase price of breeding Pig

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The purpose of this study was to examine whether the auction price of breeding pigs affected by the ranks of selection index, body type, and hoof evaluation. The rank of selection index body type and hoof evaluation datas collected from March 3, 2011 to May 22, 2019. We divided the ranking of each item into three grades. The analysis tool was Pearson simple correlation and t-test analysis. The results were as follows: (1) The Pearson simple correlation coefficient values of Duroc and Landrace boar between the selection index, body type, hoof evaluation and the auction purchase price were -0.15 and -0.20, -0.39 and -0.32, and -0.21 and -0.148, respectively. (2) The auction purchase price of breeding pigs with the elite ranks of selection index was significantly higher than that of the sub-optimal and poor ranks. The results of this study showed that the auctioneers of the breeding pigs were willing to pay a high price for the Duroc and Landrace boars with good growth performance.

Key Words: Breeding pigs, Purchase price, Affecting facts

## 90.種畜禽品種圖鑑之毛色、頭部、軀體及四肢等四項外表型特徵訂定

## 90. 種畜禽品種圖鑑之毛色、頭部、軀體及四肢等四項外表型特徵訂定

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隨著人們為貼合商業市場需求而選育出多樣化的種畜禽品種，導致品種眾多且辨識不易。為讓防檢疫及海關等第一線人員能簡易辨識輸入之種畜禽，保障國內種畜禽產業健全發展，而規劃編撰包含種畜禽品種特徵之種畜禽圖鑑。圖鑑不分畜禽章節，依乳牛、肉牛、豬、山羊、鹿、肉雞、蛋雞、命名登記雞種、肉鴨、蛋鴨、鵝、火雞及能鳥等品種品系列表，撰寫包含已核定可進口的品種品系與依畜牧法取得行政院農業委員會命名登記畜禽品種品系。家畜特徵以毛色、頭部、軀體及四肢等四項外表型描述，種禽特徵以毛色、頭部、軀體及足等四項外表型描述。藉此，提供社會大眾一本教育與資訊用途之手冊，以生活化的用語與圖片，讓社會大眾有機會了解畜產種原的繽紛世界。

關鍵語：種畜禽、品種、圖鑑

The illustrated guide of livestock and poultry breeds

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The variety of livestock and poultry breeds are prosperously increasing due to the commercial market demand following the human operation. It is difficult for us to realize the appearance of livestock and poultry according to the consequence. We composed the illustrated guide of livestock and poultry breeds with the characteristics to help the civil servants effectively clarify and identify the importation and exportation of animals. We have a list of animals including dairy, beef, swine, goat, deer, broiler, layer chicken, indigenous chicken, meat duck, layer duck, goose, turkey, Japanese Quail, and Ostrich. The characteristics of livestock and poultry divided into four sections, skin color, head, body, and legs. We want to provide the illustrated guide book for the public to step into the discovery of livestock and poultry breeds.

Key Words: Livestock, Poultry, Breeds

## 94. 臺灣山羊族群鈣蛋白酶抑制蛋白基因多態性調查

## 94. 臺灣山羊族群鈣蛋白酶抑制蛋白基因多態性調查

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鈣蛋白酶抑制蛋白 (Calpastatin) 具有抑制鈣蛋白 (Calpain) 的功能，是決定肌肉生成與肉質柔嫩度的關鍵因子。先前研究中已證實在山羊的鈣蛋白酶抑制蛋白基因 (CAST) 中，位於 exon 1C 與 exon 1D 間，長約 620 bp 的片段裡具有基因多態性。本調查以 PCR-RFLP 分析臺灣常見山羊族群，包含臺灣黑山羊花蓮品系、臺灣黑山羊恆春品系、吉安山羊、墾丁山羊、努比亞山羊、阿爾拜因山羊

與撒能山羊等品種的 CAST 多態性，結果顯示臺灣山羊族群 100% 為 MM 型。因此，進一步藉由定序分析了解此區段是否有臺灣山羊族群特有的多態性。結果顯示努比亞山羊與阿爾拜因山羊在此區間的第 190 bp、第 362 bp、397 bp 與 475 bp 處多有變異發生，而臺灣本土山羊與撒能山羊則無此情況。而了解山羊 CAST 基因的多態性可做為未來山羊基因選種的基礎。

關鍵語：山羊、鈣蛋白酶抑制蛋白、基因多態性

Investigating calpastatin gene polymorphism of goat populations in Taiwan

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Calpastatin is a calpain inhibitor and plays an important role in the myogenesis and the tenderness of the meat. Previous studies verified that the calpastatin gene (CAST) shows the polymorphism in the 620 bp length region between the exon 1C and exon 1D in goats. This study was conducted to the analysis the CAST polymorphism of Taiwan goat populations by PCR-RFLP and the populations included Taiwan black goat-Hualien line, Taiwan black goat-Hengchun line, Jian goat, Kenting goat, Nubian goat, Alpine goat, and Sanna goat. The result indicated that 100% of goats were MM type in Taiwan. To figure out whether the Taiwan goat population-specific polymorphism in this region, DNA sequencing was applied. The results showed that variants located on 190 bp, 362 bp, 397 bp and 475 bp in the Nubian and Alpine populations, however, there no altered in indigenous and Sanna populations. The clarification of CAST polymorphism could be the reference of goat genetic breeding in the future.

Key Words: Goats, Calpastatin, Gene polymorphism

#### 95. 努比亞山羊黏多醣症基因型之即時聚合酶鏈鎖反應檢測方法應用

#### 95. 努比亞山羊黏多醣症基因型之即時聚合酶鏈鎖反應檢測方法應用

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黏多醣症 (Mucopolysaccharidosis)，簡稱為 MPS，為一種體內缺乏可代謝黏多醣的 酵素，造成過量黏多醣堆積在組織與尿液中而導致的遺傳性代謝異常疾病。除人類有 黏多醣症外，多種動物亦有案例發生。目前，山羊的黏多醣症是屬於 MPS IIID 型（相當於人類黏多醣症第三型聖菲利柏氏症 D 型），僅有努比亞 (Nubian) 品種山羊的 GNS (N-acetylglucosamine-6-sulphatase, 又稱 G6S) 基因的單點突變為隱性基因遺傳，在 G6S cDNA 第 322 個核苷酸有一突變點 (C → T)。有病型個體會因此遺傳缺陷而導致早期死亡或因生長不良而淘汰。運用分子標記選拔淘汰不利動物生長發育之遺傳缺陷為提升遺傳改進之關鍵技術。本研究運用即時聚合酶鏈鎖反應模式，以螢光標記 KASP 基因型檢測技術，分析判斷奴比亞山羊黏多醣症之正常型及有病型個體。

關鍵語：山羊、黏多醣症、即時聚合酶鏈鎖反應

## Diagnosis of caprine mucopolysaccharidosis type IIID by the application of Real-time PCR platform

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Mucopolysaccharidosis refers to a group of inherited conditions in which the body is unable to properly breakdown mucopolysaccharides. As a result, these sugars buildup in cells and connective tissue, leading to a variety of health problems. Besides the Mucopolysaccharidosis found in human, there were plenty of cases found in different animals. The mucopolysaccharidosis type IIID disorders are lysosomal storage diseases. In Nubian goat MPS IIID, the G6S deficiency is associated with a single mutation, changing a C to T in the 322 nucleotide of the G6S cDNA sequence. The consequent lack of G6S activity in goats leads to the primary accumulation of uncatabolized HS-GAGs in lysosomes. The critical technique to improve genetic progress is making use of simple marker assay to cull the genetic defect, which might affect the growth performance in animals. This study is to apply Kompetitive Allele-Specific PCR (KASP) for the identification of homozygote and heterozygote in Caprine MPS IIID.

Key Words: Nubian goat, G6S, Real-time PCR

### 99.臺灣水鹿鹿草重量之個體及年度改進量

### 99.臺灣水鹿鹿草重量之個體及年度改進量

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中華民國養鹿協會為鼓勵鹿農培育優良鹿種，重視品質，增加收益，已辦理鹿隻產草量比賽活動達 14 屆。參賽鹿隻不得為不同鹿種交配繁殖之鹿隻。比賽以現場採草為限；未有評審委員在場並現場拍照而逕行採草者喪失參賽資格。使用經比賽當年校正過貼有合格標籤或以標準法碼當場校對無誤之電子秤過磅。電子秤過磅所得鹿草之台兩重量亦應拍照存查。獲獎的鹿隻計有 551 頭次，飼養於 14 個縣市。鹿草重量介於 145.6 ~ 485.3 台兩及其平均 229.7 ± 47.8 台兩(8.61 ± .79 kg)。最前 20 名次草重平均於 2012 年與 2019 年分別為 248.2 與 317.4 台兩，臺灣水鹿鹿草重量年度改進量約為 7.7((317.4 - 248.2) / 7) 台兩。

關鍵語：水鹿、鹿草、性能改進

### Individual and annual improvement of antler weight in Formosan Sambar Deer

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Deer Farmers Association R.O.C. encourages deer farmers to cultivate excellent deer species, enhance quality, and increase profits. The antler weight competition has been carried out for 14 years. Deer individuals are not allowed to breed from different deer breeds. The competition was limited to the on-site assessment; judges should present and photographed on the spot. Use the electronic scales that have been calibrated in the current year of the competition to be qualified or labelled on the spot. The weight of the antler's table obtained by weighing the electronic scale should also be photographed. The award-winning deer has only 551 heads and is raised in 14 counties and cities. The antler weight ranges from 145.6 to 485.3 tael units and its average is  $229.7 \pm 47.8$  tael ( $8.61 \pm 1.79$  kg). The top 20 velvet weight averages were 248.2 and 317.4 tael in 2012 and 2019 respectively. The annual improvement of Taiwan's Sambar antler weight was about 7.7 (  $(317.4 - 248.2 = 69.2) / 7$ ) tael.

Key Words: Sambar Deer, Antler, Performance improvement

### 103.耐熱型高繁天噸乳牛之夏季產乳量及女兒牛初產月齡

### 103.耐熱型高繁天噸乳牛之夏季產乳量及女兒牛初產月齡

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(1) 畜產試驗所 (2) 中華民國乳業協會 (3) 農業委員會

畜產試驗所新竹分所與中華民國乳業協會執行國家級 DHI 計畫，於 2014 年起為鼓勵 DHI 酪農戶致力於牛隻繁殖性能改良，畜產試驗所進行 天噸乳牛繁殖力（高繁一產積 順一易懷孕）評選，高繁天噸牛入選要件為天噸牛需其有雌親上三代系譜及自身至少有 11 次測乳之 305-2X-ME 預估乳量紀錄。DHI 戶於 2018 年測乳的 28,399 頭中，51 戶能飼養出 250 頭高繁 天噸乳牛。於 2019 年夏季（6 9 月）的日乳量較 4 5 月份的日乳量（25.28 kg）減少 2.9 6.5%。於 2019 年已有 158 頭高繁天噸乳牛，飼養於 35 戶，在 4 月份與 5 月份的日乳量分別為 33.51 與 31.34 kg，而 6 至 9 月份依序為 31.26、29.93、29.49 至 30.36 kg，顯示夏季熱緊迫可造成乳量減產 12% 之多。於 2019 年初產牛比率有 35.0%（5,045/14,404）及初產月齡平均為 26.2 月。

關鍵語：乳牛、乳量、初產月齡

Analysis on summer milk production of heat-tolerant ten-tons cows and age at first calving of their daughter

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The Hsinchu Branch of TLRI and Dairy Association Taiwan R.O.C. implemented the national



DHI program. In 2014, the DHI dairy farmers were encouraged to improve cattle breeding performance and cow fertility with lower caving ease and higher rate of pregnancy. Of the 28,399 cows from DHI farms in 2018, there were 51 farms to raise 250 head of high-prolific ten-tons cows. In the summer of 2019 (June-September), the daily milk yield decreased by 2.9 ~ 6.5% compared with the amount of daily milk in April-May (25.28 kg). In 2019, there were 158 high-prolific ten-tons cows, which were raised in 35 households. Their daily milk yield in April and May was 33.51 and 31.34 kg, respectively, and daily milk yield from June to September were 31.26, 29.93, 29.49 to 30.36 kg. It shows that summer heat stress can cause a 12% reduction in milk production. In 2019, the ratio of primiparous cows was 35.0% (5,045/14,404) and the average age of primipara was 26.2 months.

Key Words: Dairy cattle, Milk yield, Age at first calving

## 112.調查 5,000 頭以上養豬場各階段育成率與應用對策

### 112.調查 5,000 頭以上養豬場各階段育成率與應用對策

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依據中央畜產會 107 年 5 月底養豬頭數調查，臺灣毛豬飼養場共 6,999 場，扣除出清場 121 場，共有 6,878 場，108 年 5 月底飼養規模 199 頭以下 2,819 場，占總場數（不含出清場）41%，飼養頭數僅占總頭數 3.09%。飼養規模達 1,000 頭以上養豬場 1,577 場（占 22.93%），飼養頭數占總頭數 70.34%，掌握近 70% 豬源，飼養規模 5 千頭以上豬場總場數占總場數 1.92%，但生產飼養頭數卻占總頭數的 22.87%。本試驗報告在針對養豬規模 5,000 頭以上豬場收集母豬繁殖性能資料與調查豬隻各階段育成率。調查 6 家飼養 5,000 頭以上豬場 7 個月的調查資料顯示，母豬懷孕率 73.385.5%、平均活頭數 8.56 11.78 頭、離乳育成率 83.01 90.88%、保育期育成率 84.15 89.37%、全期育成率 77.23 87.12%。

關鍵語：豬、育成率

Investigating the survival rate of different stages in pig farms with over 5,000 heads scale and its application strategy

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According to the survey from the National Animal Industry Foundation in May 2018, there were 6,878 pig farms in Taiwan. In May of 2019, the pig farms with under 199 heads scale were counted 2,819 which occupied 41% of total pig farms and reared 3.09% of pigs in total pigs. Also, the pig farms with over 1,000 heads scale were counted 1,577 (22.93%) and reared 70.34% of pigs. Finally, the pig farms with over 5,000 heads scale were occupied 1.29% of total pig farms, however, they reared 22.87% of pigs in total pigs. This study was conducted to survey the reproduction performance and the survival rate in

different stages of sows in the pig farms with over 5,000 heads scale. Totally 6 farms were surveyed in 7 months, and the results showed that the pregnancy rates of sows were 73.3 to 85.5%, total number of piglets born alive were 8.56 to 11.78, survival rates on weaning were 83.01 to 90.88%, survival rates on feeder were 84.15 to 89.37% and survival rates on finisher were 77.23 to 87.12%.

Key Words: Pig, Survival rate

#### 118. 畜試土雞選育族群之家禽白血病 J 病毒監測

#### 118. 畜試土雞選育族群之家禽白血病 J 病毒監測

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家禽白血病(avian leucosis, AL)是由家禽白血病毒(avian leucosis virus, ALV)引起, 其中的 J 亞群(subgroup J ALV; ALV-J)於 1989 年出現, 造成養雞業者的嚴重損失。為了解行政院農業委員會畜產試驗所畜試土雞選育族群種雞群是否感染家禽白血病 J 病毒, 於本(2019)年進行全場選育族群候選種雞家禽白血病 J 病毒篩檢。以含抗凝J EDTA-K3 之採血器採集雞隻翼靜脈 2 毫升全血, 以核酸萃取試J進行核酸萃取後, 進行 PCR(primer H5/H7)檢測家禽白血病 J 病毒。檢測 4 個畜試土雞近親品率的候選種雞, 包括 263 隻品率 L7、202 隻品率 L9、212 隻品率 L11 及 191 隻品率 L12, 共 868 隻。檢測結果在所有送檢樣品皆呈陰性反應, 顯示該選育族群為一家禽白血病 J 病毒清淨族群。

關鍵語: 家禽白血病、家禽白血病 J 病毒、雞、監測

Avian leucosis J-virus monitoring in the selection population of LRI native inbreeding lines

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Avian leucosis is caused by avian leucosis viruses (ALVs) are prevalent in the poultry industry worldwide and cause severe economic losses. The subgroup J of ALV (ALV-J) has emerged as an important pathogen of meat-type chickens since 1989 and causes serious economic losses in poultry industry. In order to monitor ALV-J disease in the selection population of LRI native inbreeding lines, we collected blood samples of candidate breeder chicken by the blood collection device with anticoagulant EDTA-K3 in 2019. The DNAs of blood samples were extracted with nucleic acid extraction reagent and the primer kits (H5/H7) was used for ALV-J PCR detection. Four inbreeding lines of LRI native chicken were monitored in this program. Totally 868 blood samples of candidate breeder chickens including 263 Line 7, 202 Line 9, 212 Line11 and 191 L12. All of the samples were ALV-J negative. It shows that the selection population of LRI native inbreeding



lines is an avian leukemia J virus free population.

Key Words: Avian leucosis, ALV-J, Chicken, Monitoring

## 121. 檢定站種公豬精子成熟度與飼料效率之關聯性

### 121. 檢定站種公豬精子成熟度與飼料效率之關聯性

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粒線體是精子泳動及授精能力的關鍵因子，未成熟精子的粒線體潛能較成熟精子的粒線體潛能為低，精子代謝所需要的能量由粒線體提供，因此粒線體的完整度為測定精子品質的重要依據。本研究測定之年青種公豬為財團法人中央畜產會種豬性能檢定站 2016 年至 2018 年共 24 期完檢之杜洛克 (n = 1,061)、藍瑞斯 (n = 420) 及約克夏 (n = 161) 等 3 個品種計 1,642 頭種公豬。種公豬於拍賣前 20 天採集精液，採集之新鮮精液儲存於 17℃ 保溫攜回實驗室測定精液濃度，運用流式細胞儀配合可與粒線體結合的專一性染劑，染劑會依精子粒線體膜電位的不同呈現不同螢光，每頭公豬精液至少測定 5,000 隻精子之粒線體完整度，作為判別年青公豬產精能力指標，藉此評估年輕種公豬精子的成熟度，並比較精子成熟度與飼料效率之關聯性，以提供送檢豬場作為評估場內種豬選育依據。

關鍵語：種豬、精子、粒線體完整性

Correlation between the maturation of sperm and the feed conversion ratio in performance-testing boars

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Mitochondria play an important role in the motility and fertility of sperm by providing energy for metabolism. Therefore the mitochondria integrity is a vital criterion for grading the quality of sperm. This study was conducted to monitor the 24 batches of performance-testing boars including 1,061 Duroc, 420 Landrace and 161 Yorkshire breeds from 2016 to 2018. The semen was collected from boars by 20 days before the auction and stored at 17°C. In consequence, the semen was analyzed by the flow cytometry, at least 5,000 sperms were checked for the integrity of mitochondria to distinguish the sperm productive capability of young boars. Eventually, the correlation between the maturation of sperm and the feed conversion ratio was clarified and it could be the reference for the selection of breeding pigs.

Key Words: Breeding pig, Sperm, Mitochondrial integrity