

## 第四十七卷(2018)

### 8. 生醫用小型豬異地飼養之繁殖性能

日期2020/2/18 16:15:34

#### 8. 生醫用小型豬異地飼養之繁殖性能

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本試驗旨在分散小型豬種原集中保存的風險與增加異地保種場的建置，持續開發穩定供應西部醫學研究中心使用生醫用小型豬做為實驗動物。本計畫自105年逐年引進遺傳穩定的小型豬族群，並收集異地飼養場的繁殖性能進行評估。試驗共收集30胎蘭嶼豬與3胎迷彩豬母豬資料，試驗結果顯示，蘭嶼豬與迷彩豬平均出生總仔數分別為 $6.53 \pm 2.19$ 與 $6.67 \pm 1.53$ 頭、出生活仔數 $4.97 \pm 2.19$ 與 $4.33 \pm 0.58$ 頭、出生體重 $0.43 \pm 0.15$ 與 $0.68 \pm 0.26$ 公斤，21天體重 $3.88 \pm 0.62$ 與 $3.20 \pm 0.77$ 公斤，左乳頭數 $5.33 \pm 0.55$ 與 $5.76 \pm 0.83$ 個、右乳頭數 $5.35 \pm 0.54$ 與 $5.88 \pm 1.17$ 個與總乳頭數 $10.68 \pm 0.99$ 與 $11.65 \pm 1.97$ 個。綜合以上性能調查，蘭嶼豬與迷彩豬出生頭數約為6.5頭，出生體重迷彩豬略重於蘭嶼豬，但21天體重則以蘭嶼豬較重，顯示蘭嶼豬出生後母豬泌乳性能較佳。

關鍵語：生醫、小型豬、繁殖性能

The reproductive performance of the biomedical-application minipigs in the isolated conservation center

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In order to sustainably provide the research centers with minipigs as a biomedical research model, the purpose of this research is to minimize the risk of pure-breed minipig conservation and to build up the isolated conservation center for the minipig breeds. From 2016 to 2018, the genetic stable minipigs were introduced into the isolated conservation center and the reproductive performance of minipigs was be evaluated. All data were collected from 30 litters of Lanyu pig and 3 litters of LRI Mitsae pig. The results showed that the total number of piglets born (TNB), total number of piglets born alive (NBA), birth weight (BW), weight at 21 days (W21), number of teats at left, number of teats at right and total number of teats were  $6.53 \pm 2.19$  and  $6.67 \pm 1.53$ ,  $4.97 \pm 2.19$  and  $4.33 \pm 0.58$ ,  $0.43 \pm 0.15$  and  $0.68 \pm 0.26$ ,  $3.88 \pm 0.62$  and  $3.20 \pm 0.77$ ,  $5.33 \pm 0.55$  and  $5.76 \pm 0.83$ ,  $5.35 \pm 0.54$  and  $5.88 \pm 1.17$  ,  $10.68 \pm 0.99$  and  $11.65 \pm 1.97$ , respectively. According to the investigation of reproductive performance shown above, the TNB of Lanyu pig and LRI Mitsae pig are around 6.5, and the Mitsae pigs showed the higher BW than the LRI Mitsae pigs. Furthermore, the Lanyu pigs performed the higher W21 demonstrated that the Lanyu pigs had the better lactation performance after the

delivery.

Key Words: Biomedical, Minipigs, Reproductive performance

## 71. 凱馨烏骨雞之微衛星遺傳標記多態性分析

### 71. 凱馨烏骨雞之微衛星遺傳標記多態性分析

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為評估凱馨烏骨雞選育族群的遺傳變異，本試驗利用FAO(2010)建議使用的24組雞微衛星標記組分析64隻凱馨烏骨雞第G3世代種雞個體DNA。其中除MCW0103微衛星標記所檢測的基因型在所有檢測個體皆為單型外，其它23組微衛星標記皆有多態型的基因型。共檢測到98個對偶基因，平均每個基因座具有4.1個對偶基因(0~7個)；期望異質度介於0到0.798，平均為0.548；觀測異質度介於0到0.641，平均為0.400，而多態性訊息含量平均為0.491。在選用的24組微衛星標記組中有13組呈現高度多態性資訊(PIC  $\geq$  0.5)，有9組呈現中度多態性資訊( $0.5 > \text{PIC} \geq 0.25$ )，2組呈現低度多態性資訊(PIC

關鍵語：烏骨雞、多態性、微衛星遺傳標記

### Polymorphism analysis of Kai Shing silkie chicken by microsatellite markers

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In order to evaluate genetic variation of Kai Shing silkie chicken flock. we use a set of 24 microsatellite markers recommended by FAO to analyze 64 candidate bred chickens from this flock. Except MCW0103, all the microsatellites were polymorphic with average allelic number 4.1, ranged from 0 to 7 per locus. The expected heterozygosity ranged from 0 to 0.798, and the average expected heterozygosity was 0.548. The observed heterozygosity of the population ranged from 0 to 0.641, and the average observed heterozygosity was 0.400. The estimated average polymorphic information content (PIC) was 0.491. In 24 markers, 13 markers were highly informative with polymorphism information content (PIC  $\geq$  0.5), nine markers were reasonably informative( $0.5 > \text{PIC} \geq 0.25$ ) and the other two markers were slightly informative (PIC

Key Words: Silkie chicken, Polymorphism, Microsatellite marker

## 86. 平飼土雞墊料品質與接觸性足墊皮膚炎之相關性研究 - 雞隻足墊皮膚炎研究模式的建立

### 86. 平飼土雞墊料品質與接觸性足墊皮膚炎之相關性研究 - 雞隻足墊皮膚炎研究模式的建立

謝佳容(1) 蘇安國(2)

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本試驗旨在了解墊料品質對雞隻足墊的影響，並且建立足墊皮膚炎之研究模式。高畜L12 × L9土雞以每平方公尺12隻的密度飼養，並試圖外加水份於墊料以誘發足墊病變。濕墊料組在試驗第8週時(15週齡)，約有17%的雞隻足墊部出現紅腫，在第9週時有外傷的情形發生。在乾墊料組方面，雞隻足墊部紅腫的現象遲至試驗的第9週才發生，約有6.62%的雞隻出現此病癥。至第12週結束試驗時，在濕墊料組有31.92%的雞隻表現足墊炎隻病徵，而FPD平均分數為0.36。在乾墊料組，有25.40%的雞隻表現足墊炎隻病徵，而FPD平均分數為0.27，無論在足墊炎的發生率與FPD平均分數上都較濕墊料組為低，顯見以增加墊料水份的方式可成功誘發足墊炎。在試驗第12週時，以卡方檢定驗證足墊炎的發生與個體體重有關。並且，足墊炎的發生率及嚴重程度也有性別上的差異。

關鍵語：土雞、墊料、足墊皮膚炎

The association between the litter quality and contact footpad dermatitis in floor-housed native chickens --The research model establishment of chicken footpad dermatitis

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This study was conducted to understand the influence of litter quality on the native chicken footpad and to establish the research model of footpad dermatitis. Crossbreed native chickens from TLRI K12 and K9 were reared under 12 birds/m<sup>2</sup> rearing density, to induce the lesion of footpad, the moisture of litter was increased by adding water. In the water added group, around 17% chickens' footpad turned red at 8th week (15 weeks old), and the trauma on footpads showed at 9th week. In the no water added group, around 6.62% chickens' footpad turned red at 9th week. At the end of this experiment at 12th week, there are 31.92% chickens had FPD and got the FPD mean score of 0.36 in the water added group. Furthermore, in the no water added group, around 25.40% chickens suffered FPD and had the FPD mean score of 0.27. No matter the incidence of FPD or the FPD mean scores, both were higher in the water added group, it means that the FPD could be successfully induced by water adding in the litter. After Chi-square analyzed, the incidence of FPD had corresponded to the body weight of individuals. Finally, the incidence and severity of FPD differed by the genders.

Key words: Native chicken, Litter, Footpad dermatitis

89. 天噸乳牛305-2X-ME乳量預估值泌乳曲線探析

89. 天噸乳牛305-2X-ME乳量預估值泌乳曲線探析

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臺灣乳牛群性能改進計畫 (DHI) 自 2001 年 1 月至 2018 年 10 月止計有 215,677 頭泌乳牛參加測乳，依泌乳牛之產次、分犊月份、產乳天數及該月的採樣日測乳量，而預估這個泌乳期 305 天之擠乳兩次的成熟年齡 (305-2X-ME) 乳量預估值。當這頭泌乳牛有測乳 5 次以上的 305-2X-ME 乳量預估值其平均 10,000 Kg 以上，該頭乳牛年產乳量有 10 噸以上，10 噸的英文是 Ten Tons，取其音取其義，稱這種乳牛為天噸乳牛 (Ten-Tons Cow)。依天噸乳牛測乳最後的年來看，從 2001 年的 32 頭天噸乳牛，逐年增加至 2018 年的 2,305 頭，18 年來總計有 9,261 頭天噸乳牛。本研究應用 2018 年的 2,305 頭天噸乳牛來探析 305-2X-ME 乳量預估值泌乳曲線。2018 年的天噸乳牛平均乳量為 10,798Kg (最高產乳量有 14,448 Kg)、平均測乳 16.5 月次、平均 50 月齡，之中有測乳達 90 月次及 13.3 年齡。設定測乳月次 30 次以上的為高繁天噸乳牛，計有 273 頭，其乳量平均為 10,808Kg 及平均 80.8 月齡。高繁天噸乳牛之 305-2X-ME 乳量預估值泌乳曲線並非呈現水平線，但多隨母牛產次增加而先提高至第 5 產次再下降。因此，本研究探析出產乳量持續度高的高齡多胎牛隻之 305-2X-ME 乳量預估值泌乳曲線型態有多種，以斜線上升型泌乳曲線居多，其次為上拋物線型。

關鍵語：乳牛、產乳量、產次

Analysis on the lactation curve of 305-2x-me milk yield estimation of ten-tons cow

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Taiwan Dairy Herd Improvement Program (DHI) has 215,677 milking cows from January 2001 to October 2018, the maturity equivalent milk yield estimation of 305-2X-ME was adjusted by the parity of the testing cow, the month of calving, the number of days after calving for milk sampling to the total amounts of milk for 305 days of lactation. When this lactating cow has an estimated 305-2X-ME for more than 5 times and its average is more than 10,000 kg, it is considered that the annual milk yield of the cow is 10 metric tons or more, and 10 metric tons of English is Ten-Tons, take its sound and take it as its name, saying that this cow is a Ten-Tons Cow. According to the year of last milk testing for Ten-Tons Cow, there were 32 cows in 2001 and then increased year by year to 2,305 cows in 2018. In the past 18 years, there were a total of 9,261 head of Ten-Tons Cow. This study used those of 2,305 cows in 2018 to analyze the lactation curve of the 305-2X-ME milk yield estimation. In 2018, the average milk yield of cows is 10,798 kg (the highest milk yield is 14,448 kg), the average milk sampling is 16.5 times, and the average age is 50 months old. Among them, the greatest times of milk sampling is 90 times and the maximum age is 13.3 years old. There are 273 cows with a higher than 30 times of milk sampling, and the average milk yield is 10,808 kg and an average age of 80.8 months old. The lactation curve of 305-2X-ME milk yield estimation of prolific Ten-Tons Cow is not in the horizontal line, but its milk yield increased with the parity of cows to the fifth parity. In this study, we can plot lactation curves of 305-2X-ME milk yield estimation of higher age and prolific cows with various parties. The typical lactation curve was mostly in the type of the ascending line, and secondly was in the type of the upper parabolic type.

Key Words: Dairy cattle, Milk yield, Parity

## 121. 檢定站種公豬各季節精子成熟度之比較

### 121. 檢定站種公豬各季節精子成熟度之比較

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粒線體是精子泳動及授精能力的關鍵因子，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。本試驗目的為年青公豬精子在不同季節之成熟度之比較，作為遺傳選拔的評估參考。年輕種公豬精子成熟度的評估可藉由流式細胞儀檢測其粒線體之完整性。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2017年共16期完檢之杜洛克、藍瑞斯及約克夏等3個品種計1079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及同步快速測定每頭公豬精液至少5,000隻精子之粒線體完整度，作為判別年青公豬產能指標。檢測結果顯示，杜洛克 (n=701)、藍瑞斯 (n=270) 及約克夏 (n=180) 公豬其各項分析項目之結果以平均值 ± 標準偏差表示。各季節精子粒線體完整度均以第一季 (一至三月) 最佳，分別為  $66.7 \pm 20.3\%$ 、 $67.4 \pm 23.7\%$  及  $67.9 \pm 25.8\%$ 。

關鍵語：種豬、精子、粒線體完整性

Comparison of sperm maturity in breeding pig of the pig performance testing station in different seasons

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Mitochondria play the important role in the motility and fertility of sperm via providing the energy for the metabolism of sperm. Therefore the mitochondria integrity is a vital criteria the quality of sperm. The objective of this study is conducted to compare the maturation of sperm mitochondria in young boars from different seasons to establish the reference for the genetic selections. The flow cytometry was applied to detect the integrity of mitochondria as well as the maturation of sperm from the young boars. 16 batches of boars from 2016 to 2017, totally 1079 boars from 3 breeds (Duroc, Landrace and Yorkshire) in the Pig Performance Testing Station of National Animal Industry Foundation were tested. The semen was collected from boars by 20 days before the auction and stored at 17 °C. Consequently, the semen was analyzed by the flow cytometry, at least 5,000 sperms were be checked for the integrity of mitochondria to distinguish the sperm productive capability of young boars. The results showed that the sperm collected in the first season (from January to March) had the best mitochondria integrity and the mean values of integrity were  $66.7 \pm 20.3\%$ ,  $67.4 \pm 23.7\%$  and  $67.9 \pm 25.8\%$  in Duroc (n=701), Landrace (n=270) and Yorkshire (n=108) respectively.

Key Words: Breeding pig, Sperm, Mitochondrial integrity

### 123. 導入智慧農業4.0機器人到乳牛場之天眼應用研究

### 123. 導入智慧農業4.0機器人到乳牛場之天眼應用研究

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推料餵牛機器人係本所於106年引進之智慧型推草餵牛省電智慧化設備，可使用行動裝置透過藍芽連線遙控行走的功能。導入示範場域後有效取代每日3到4小時的人力需求，並可增加牛隻的進食次數及進食量，使乳量更為穩定並增加3到8%。為了使推料作業可以呈現現場的餵養牛隻狀況，本所創新設計整合現行WebCam(網路攝影機)監控設備作為天眼，以畜牧場現有已佈建的Wi-Fi無線網路為基礎。透過網際網路提供牧場主人即使出門在外，亦可透過手機APP 隨時監視牛隻餵養情形，除了可以遠端查看牛隻進食狀況外，亦能確認牛隻背部拱起情形以辨識牛隻的腳部健康。

關鍵語：機器人、天眼、推料機、網路攝影機

Application Study of Web Camera on Robots Using in Dairy Cattle Farms Under Smart Agriculture 4.0 Program

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The push-feeding robot is a smart-type grass-feeding and intelligent power-saving device introduced by Livestock Research Institute in 2017. It can use the mobile device to remotely control the walking function through the Bluetooth connection. After importing to the demonstration dairy farm, it effectively replaces the manpower requirement of 3 to 4 hours per day, and increases the eating times and quantity of the cows. It also making the milk amount more stable and increasing by 3 to 8%. In order to enable the push-feeding robot to present the situation of feeding cattle in the field, we creatively integrate the current Web Camera (network camera) monitoring device as the eye, based on the existing Wi-Fi wireless network built by the dairy farm, through the Internet. Through the Internet, the ranchers can monitor the feeding of cattle at any time through the mobile application software. They can remotely check the feeding status of the cows at the far end. It can also confirm the back of the cattle to identify the feet health of cattles.

Key Words: robot, sky-eye, forage pusher, web camera

### 126. 畜試土雞品系L9母雞 Z 染色體上SNP基因型與產蛋性能的分析

### 126. 畜試土雞品系L9母雞 Z 染色體上SNP基因型與產蛋性能的分析

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為探討母雞Z染色體上SNP基因型與其產蛋性能之關聯性。本試驗利用雞Z染色體上131組SNP引子組檢測分析92隻畜試土雞品系L9母雞個體DNA，並將檢測出的SNP基因型與母雞產蛋性能進行關聯性分析。其中有82組SNP引子組所檢測出基因型在所有檢測個體皆為單型外，其它49組引子組皆有檢測出不同基因型。將母雞SNP基因型與其產蛋性能進行差異性分析，有3組引子組的不同基因型在母雞初產日齡有顯著差異(P

關鍵語：雞、SNP、產蛋性能

Analysis of SNP genotypes on Z chromosome and laying performance in LRI-L9 hens

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To study the relationship between SNP genotypes on the Z chromosome of hens and their laying performance. In this experiment, 131 SNP primers on chicken Z chromosome were used to detect the individual DNA of 92 hens in the LRI-L9 selection flock, and the detected SNP genotypes were analyzed the correlation with laying performance of hens. Among them, 82 SNP primer kits detected genotypes in all tested individuals were single type, and other 49 primer kits detected different genotypes. Differences in hens' SNP genotypes and their laying performance were analyzed. We found that it was significant differences in the age at first egg of hens with different genotypes in 3 SNP primer kits (P

Key Words: Chicken, Single nucleotide polymorphism, Laying performance

#### 127. 台灣登錄種羊黏多醣症基因型頻率

#### 127. 台灣登錄種羊黏多醣症基因型頻率

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黏多醣症第三型(G6S)是山羊的隱性遺傳疾病。檢測 8家 982 頭登錄種羊之黏多醣症第三型(G6S)基因型，完成8場(畜試所營養組、恆春分所、花蓮種畜繁殖場、澎湖工作站、大鵬乳羊畜牧場、成立種肉羊畜牧場、神來畜牧場及晨光畜牧場)，包括303頭努比亞、494頭阿爾拜因、89頭撒能、4頭波爾、44頭台灣黑山羊、32頭吉安山羊及16頭墾丁山羊，試驗結果，除阿爾拜因有7頭母為G6S AB雜合型外，其他羊隻皆為G6S AA正常型，雜合型羊隻已建議畜主考慮淘汰。本試驗所得結果比林等2008年的報告 G6S非正常型頻率低很多(0.7%比5.9%)，顯示十年來養羊產業已應用此基因選種技術進行種羊選種，將有助於整體生產體系之效率提高。

關鍵語：登錄種羊、黏多醣症、基因型頻率

Frequency of mucopolysaccharidosis IIID genotypes of registered breeding goat in Taiwan

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Caprine mucopolysaccharidosis IIID, or N-acetylglucosamine 6-sulfatase deficiency (G6S), is a recessive inherited disorder of goat. There were 982 goat DNA samples tested from 8 herds of 303 Nubians, 494 Alpines, 89 Saanens, 4 Boers, 44 Taiwan Black Goats, 32 Ji'an goats and 16 Kenting goats. The result showed that except for Alpine goat, there are 7 female goats in the G6S AB heterozygous type, the other goats are all G6S AA normal type. Goats with heterozygous type have been advised to consider elimination. The frequency of abnormal G6S genotypes in this experiment was much lower than reported by Lin et al. in 2008 (0.7 % vs 5.9 %), indicating that the goat industry has applied this gene selection technique for breeding goat in the past ten years to improve the efficiency of overall production system in Taiwan.

Key words: Registered breeding goat, Mucopolysaccharidosis, Frequency of Genotype