

## 第三十一卷(2002)

畜試土雞種原的雛白痢檢測

日期2006/9/29 16:06:01

### 畜試土雞種原的雛白痢檢測

鍾秀枝(1) 連一洋(2) 張秀鑾(1) 黃祥吉(1) 林德育(1)

(1)行政院農業委員會畜產試驗所 (2)國立屏東科技大學獸醫系

雛白痢(PD)是白痢沙氏桿菌引起之家禽介卵傳染病，受感染之幼雛會出現腸炎和白痢等症狀，並造成高死亡率。然受感染之成雞則成為無症狀之帶菌者，其會經由種蛋傳染至雛雞。因此，雛白痢清除為養雞產業重要課題之一。本試驗應用行政院農業委員會畜產試驗所2001年繁衍之四個近親品系土雞(L7公雞185隻、母雞435隻，L9公雞220隻、母雞543隻，L11公雞141隻、母雞821隻，L12公雞182隻、母雞408隻)種雞群，計2207隻，於選種前進行雛白痢全面篩檢。檢測方法以血清學檢查方法進行之，雞隻經採血分離血清後，應用行政院農業委員會家畜衛生試驗所雛白痢診斷液作平板凝集試驗；分別以25 ul血清加入25 ul抗原攪均後，於1分鐘內呈紫色顆粒狀凝集者為陽性反應，1分鐘後未呈現凝集現象者為陰性反應。檢測結果顯示：四個近親品系土雞之陽性率分別為L7公雞11.4 %、母雞16.6 %，L9公雞8.2 %、母雞8.5 %，L11公雞9.2 %、母雞15.0 %，L12公雞2.2 %、母雞11.8 %。四個近親品系土雞之陽性率無論公母皆以L7較高，而公雞最低者為L12，母雞最低者為L9。進一步評估母雞40週齡產蛋數發現，雛白痢陰性反應母雞之產蛋數顯著高於陽性反應者(62.7 vs. 59.6個，P

關鍵語：雛白痢、陽性率、產蛋數。

PULLORUM DISEASE SCREEN FOR TLRI NATIVE CHICKEN

H. C. Chung(1), Y. Y. Lien, H. L. Chang(1), H. C. Huang(1) and D.Y. Lin(1)

(1)Taiwan Livestock Research Institution of COA (2) Department of Veterinary Medicine, National Pingtung University of Science and Technology

Salmonella pullorum is known as the cause of pullorum disease (PD), which can be contagious through egg and is characterized by enteritis and white diarrhea symptoms with high mortality in chicks. However, infected adult chicken becomes no symptomatic carrier and infects the chicks via eggs. Thus, PD elimination becomes one of the important issues in poultry industry. A total of 2207 chickens propagated from Chicken Farm/TLRI/COA in 2001 were screen for PD free prior to selection, which including four inbred lines (185 and 435 birds of L7, 220 and 543 birds of L9, 141 and 821 birds of L11, and 812 and 408 birds of L12 for cocks and hens, respectively). The diagnostic test used was serum agglutination test to eliminate the reactors from the breeding flocks. After serum separated whole blood sample, 25 ul diagnostic antigen obtained from National Veterinary

Research Institute/Council of Agriculture was added and mixed thoroughly with 25 ul bird serum by use of the tip of the serum pipette. The bird was classified as positive reactor if agglutination occurred within one minute and negative otherwise. Frequencies of positive were 11.4% and 16.6% (L7), 8.2% and 8.5% (L9), 9.2% and 15.0% (L11), 2.2% and 11.8% (L12) for cocks and hens, respectively. Results indicated that the L7 had the highest infection rate in both cocks and hens among lines considered in this study; L12 and L9 showed the lowest contagious rates in cocks and hens, respectively. Also, negative hens had better laying performance than those of positive ones in terms of egg number produced up to 40 weeks of age (62.7 vs. 59.6 eggs, P

Key Words: Pullorum disease (PD), Positive frequency, Egg number.

## 桃園種豬繁殖性狀之觀察

### 桃園種豬繁殖性狀之觀察

顏念慈 蔡金生 蘇天明 李世昌 張秀鑾

行政院農業委員會畜產試驗所

為瞭解保種場桃園種豬之繁殖特性，應用從1986年3月20日至2001年6月8日之間保種場288頭桃園種母豬分娩之529胎資料，分析其平均分娩總頭數與分娩活頭數，並依據初產日齡在730日以下，且胎距在365日齡以下之條件計算平均初產日齡與平均胎距；其次選取15頭桃園種豬種母豬，進行2-3次發情觀察，計算其平均動情週期；最後由種公豬98頭與種母豬31頭之初生日期與死亡日期，計算其平均繁殖壽命。平均分娩總頭數與平均分娩活頭數 觀察結果顯示，平均分娩總頭數除第一產次為9.3頭外，第二至七產次皆在10頭以上，而各胎次平均分娩活頭數皆在6.7頭以上，第二產次最好為8.1頭。桃園種豬種母豬的平均初產日齡為649.2日，各產次平均胎距介於183至213日之間。桃園種種母豬之平均動情週期在22.2日(n=25)。桃園種公、母豬之平均繁殖壽命分別為1350.6與1104.2日，雖無顯著差異，但種母豬最長壽之年齡為4492日，而種公豬則為2815日。

關鍵語：桃園種豬、繁殖性狀、觀察

INVESTIGATION ON REPRODUCTIVE TRAITS OF TAOYUAN BREED

N. T. Yen, G. S. Tsai, T. M. Su, S. C. Lee, H. L. Chang

Taiwan Livestock Research Institution of COA

For understanding the reproductive characteristics of Taoyuan breed, five hundred twenty-nine litters data farrowed from 288 Taoyuan sows in pig farm of conservation since March 20 of 1986 until June 8 of 2001 were used to analysis average total number of piglets at birth (TNB) and number of piglets born alive (NBA). We calculated the average age of primiparity and farrowing interval between two neighbor litters according to the conditions that the age of primiparity was under 730 days and farrowing interval between two neighbor litters was under 365 days. Then 2-3 estrus cycles of 15 Taoyuan sows were

investigated, and the average duration of oestrus cycle was calculated. Finally, the average lifespan of Taoyuan breeding stock was calculated from birthday to the date of death of 98 boars and 31 sows. The results of investigation of TBN and NBA, except primiparity, TBN was 9.3 heads, the other parities (2-7 parities) were above 10 heads. The NBA of all parity were above 6.7 heads, the secondary parity was 8.1 heads and was the best one. The average age of primiparity was 649.2 days, and average farrowing interval between two neighbor litters was from 183 to 213 days. The average duration of oestrus cycle in Taoyuan sow was 22.2 days (n=25). The average lifespan of Taoyuan boar and sow were 1350.6 days and 1104.2 days, respectively. There was no significant difference between boar and sow, but the longest lifespan was 4492 days for sow and 2815 days for boar.

Key Word : Taoyuan pig, Reproductive traits, Investigation

多產豬種之培育 梅山與杜洛克豬雜交三代之生長性狀

多產豬種之培育 梅山與杜洛克豬雜交三代之生長性狀

張伸彰 涂海南 許晉賓 吳明哲 張秀鑾

行政院農業委員會畜產試驗所

本研究旨在探討梅山豬(M)與杜洛克(D)豬雜交二代F2(MDMD與MDDM分別以md與dm簡稱)後裔豬之生長性能,藉此瞭解雜交三代(F3)生長性能作為未來選拔依據。試驗豬群包括F2代md公豬與配md母豬之後裔(mdmd)公豬50頭,女豬87頭、dm公豬與配md母豬之後裔(mddm)公豬48頭,女豬79頭、md公豬與配dm母豬之後裔(dmmd)公豬52頭,女豬64頭和dm公豬與配dm母豬之後裔(dmdm)公豬52頭,女豬86頭,計有公豬202頭與女豬316頭。參試豬隻生長性能檢定期間自70至210日齡,測定性狀包括70(W70)、90(W90)、120(W120)、150(W150)、180(W180)與210日齡(W210)之體重,及150(BF150)、180(BF180)與210日齡(BF210)之第五肋、最後肋與最後腰椎離背中線5公分處之背脂厚度平均。公豬採個檢方式進行,並測定檢定期間之飼料效率(FE);而女豬則以群檢方式進行。結果顯示:mdmd女豬W180與W210均顯著較mddm及dmdm者重(P

關鍵語:梅山豬、杜洛克豬、生長性能。

DEVELOPMENT OF PROLIFIC LINE IN SWINE III. GROWTH TRAITS IN F3 OF MEISHAN AND DUROC CROSSES

S. C. Chang, H. N. Twu, C.B. Hsu, M. C. Wu and H. L. Chang

Taiwan Livestock Research Institute, Council of Agriculture

The objective of this study was to evaluate the growth performances of F3 generation in Meishan (M) and Duroc (D) crosses pigs for selection reference. Pigs evaluated including progeny of F2, expressed as md and dm for MDMD and MDDM, respectively, which were obtained from intercrossing of M and D crosses. There were four groups of F3 pigs tested which mdmd, mddm, dmmd and dmdm being the progeny of md sows sired by md boars, md sows sired by dm boars, md sows sired by dm boars and dm sows sired by dm boars, respectively.

A total of 202 boars and 326 gilts were growth performances tested during 70 and 210 days of age, which including 50 boars and 87 gilts of mdmd, 48 boars and 72 gilts of mddm, 52 boars and 64 gilts of dmmd, and 52 boars and 86 gilts of dmdm crosses, respectively. Traits evaluated were body weights at 70 (W70), 90 (W90), 120 (W120), 150 (W150), 180 (W180) and 210 (W210) days of age, and averaged backfat thickness at 150 (BF150), 180 (BF180) and 210 (BF210) days of age which were measured at 5 cm from dorsal line of the fifth and the last ribs, as well as the last lumbar. Boars were tested individually and the corresponding feed efficiency during testing period was also evaluated. Since gilts were group housed, feed consumed information was lacked. Result showed that mdmd gilts weighed heavier at 180 and 210 days of age than those of mddm and dmdm gilts (P

Key Words: Meishan pigs, Duroc pigs, Growth performances.

多產豬種之培育 動情素接受體基因型之產仔效應

多產豬種之培育 動情素接受體基因型之產仔效應

張秀鑾 陳佳萱 黃憲榮 張伸彰

行政院農業委員會畜產試驗所

豬隻動情素接受體(ESR)基因座被認為與窩仔數有關，評估有利對偶基因B對初產與經產母豬之效應分別為0.42 and 0.31頭總產仔數。本研究總計篩檢136頭梅山與杜洛克雜交選育之F2世代種豬(101頭母豬與35頭公豬)之ESR基因型，並評估其產仔性能，包括分娩總仔數(LS)、活仔數(LSA)、三週活仔數(LS3)、離乳活仔數(LSW)、仔豬平均初生重(BWT)、三週重(WT3)與離乳重(WWT)。應用線性模式進行統計分析，固定效應包括品種組成、產次、公母豬ESR基因型與兩者之交感效應。結果顯示：LS( $p=0.0407$ )、LSA( $p=0.0184$ )與LS3( $p=0.0211$ )具顯著的公母豬ESR基因型交感效應，而WWT( $p=0.0535$ )之效應則稍弱。同時，AA與AB型母豬與配BB型公豬者，較與配AB型公豬者，可生產較大的窩仔數(LS、LSA、LS3與LSW)；此與BB型母豬之表現不同。

關鍵語：多產品系、動情素接受體基因型、產仔性能。

DEVELOPMENT OF PROLIFIC LINE IN SWINE IV. THE EFFECTS OF ESTROGEN RECEPTOR GENOTYPES ON LITTERING PERFORMANCES

H. L. Chang, C. H. Chen, H. R. Huang and S. C. Chang

Taiwan Livestock Research Institute, Council of Agriculture

The estrogen receptor (ESR) locus is known to be associated with litter size in pig. Favorable effects of B allele reported were 0.42 and 0.31 for litter size at birth in first and later parities, respectively. A total of 136 animals (101 sows and 35 boars) from F2 of Meishan and Duroc crosses were genotyped at the ESR locus and evaluated for littering performances including litter sizes at birth (LS), born alive (LSA), at 3-week-age (LS3) and at weaning (LSW), and averaged individual weights at birth (BWT), at

3-week-age (WT3) and at weaning (WWT). Data were analyzed using a linear model including the fixed effects of breed composite, parity of sow and ESR genotypes of sow and boar as well as interaction between ESR genotypes of sow and boar. Interaction between ESR genotypes of sow and boar had significant effects on LS ( $p=0.0407$ ), LSA ( $p=0.0184$ ) and LS3 ( $p=0.0211$ ) and a nominally significant effect on WWT ( $p=0.0535$ ). AA sows sired by BB boars produced larger litters (LS, LSA, LS3 and LSW) when compared to those sired by AB boars. Similar trend was also observed in AB sows. However, it was not the case in BB sows.

Key Words: Prolific line, Estrogen receptor genotypes, Littering performances.

### 性能檢定站種豬體型評鑑

#### 性能檢定站種豬體型評鑑

賴永裕(1) 宋永義(2) 王佩華(2) 王旭昌(3) 李世昌(1) 張秀鑾(1)

(1)行政院農業委員會畜產試驗所 (2)國立台灣大學畜產系 (3)財團法人中央畜產會

豬體型與其瘦肉量息息相關，且歷年來展示拍賣會中種豬售價與生長指數排名之不一致現象亦顯示各豬場對豬隻體型的重視程度。然因過去國內育種制度目的在協助農民加速豬隻生長性狀改良，提供國人足夠動物性蛋白質來源，故未將體型評鑑作進一步的量化，以致未能落實體型改良於豬種選拔之實務工作。目前中央畜產會在每期種豬拍賣時亦同時提供完檢女豬之展示拍賣，並於200201期開始依行政院農業委員會畜產試驗所第三與六次網路養豬會議與中央畜產會種豬育種改良工作推動小組第八次會議討論結果，組織體型評鑑小組進行體型評鑑試評，期建立完整的體型評鑑標準程序。試評方法依品種、公母取完檢頭數的三分之一開始排名，由評鑑人員就完檢豬群最多以每9頭為一組，目視體型做第一次分組初排名，將各評鑑員的各組排名平均後，取每組前三名為入圍豬，入圍豬再進行第二次的總排名，並針對入圍豬優點部位(分頭頸、體軀、四肢與尾根)給予適當評語與排名，並酌選優良等級豬。體型評鑑相關資料(包括完檢後、體型評鑑後與豬隻優點部位之影像)於拍賣會前同步公佈於網路養豬網站 <http://www.angrin.tlri.gov.tw>，供標購者上網參考。

關鍵語：體型、評鑑、網站。

#### PIG JUDGING IN TEST STATION

Y. Y. Lai(1), Y. Y. Sung(2), P. H. Wang(2), S. C. Wang(3), S. C. Lee(1) and H. L. Chang(1)

(1)Taiwan Livestock Research Institute, COA (2)National Taiwan University  
(3)National Animal Industry Foundation

Body conformation is highly associates with lean meat production in pig. Breeders did not select the replacement based on selection index only which could be verified by the inconsistence between auction price and selection index. To provide adequate animal

origin protein, growth traits improvement gained more attention than body conformation in pigs during the past three decades. Thus, neither conformation score for pig judging is available nor is practiced in breeding strategy in Taiwan. Since full-sib gilts completed test can participate the auction by the new modified breeding system recently. Followed by the conclusion obtained from the eighth swine improvement meeting held in TLRI, a pig judging system should be developed and conducted with performance test procedure. Therefore, top one-third of off-test pigs were judged within breed and gender class. Maximum nine pigs were ranked for the first judge and three were chosen for final ranking and judging statement. Information including pig judging results (positive terms in head, body, legs, feet and movement) and image files was provided in the web site (<http://www.angrin.tlri.gov.tw>) for buyers' references before auction.

Key Words: Body conformation, Judging, Internet web site.

### 台灣商業豬種動情素受體基因頻率分析

#### 台灣商業豬種動情素受體基因頻率分析

陳佳萱(1) 賴永裕(1) 劉桂柱(2) 張秀鑾(1)

(1)行政院農業委員會畜產試驗所 (2)台灣區種豬發展協會

本試驗針對90-91年台灣地區商業用種豬(L、Y、D)進行動情素受體基因座隨機檢測，共蒐集19家種豬場，2,102頭種公母豬，包括藍瑞斯723頭、約克夏120頭、杜洛克1259頭。文獻指出，豬隻動情素受體(Estrogen receptor, ESR)基因座位於豬第一對染色體短臂上，具有兩個交替基因A和B，ESR基因型為BB之母豬較AA型者，每胎分別可多分娩1.5與1.0頭以上仔豬與活仔豬，故亦將ESR基因座之B交替基因稱為多產基因。本試驗檢測方式採限制酶分切片段長度多態性(RFLP)與單點核 $\alpha$ 33527;酸突變點拆離式聚合酶連鎖反應(MS-PCR)方式兩者交叉比對，減少判讀錯誤率。基因頻率檢測結果顯示，藍瑞斯B交替基因頻率為0.07、約克夏0.28、杜洛克則為0.01。

關鍵語：動情素受體、基因頻率、豬隻。

#### THE PROLIFIC GENE FREQUENCY OF ESTROGEN RECEPTOR IN TAIWAN COMMERCIAL BREEDING STOCKS

C. H. Chen(1), Y. Y. Lai(1), K. C. Liu(2) and H. L. Chang(1)

(1)Taiwan Livestock Research Institute of COA (2)Formasan Farmers Association for Swine Improvement

To understand gene frequencies of estrogen receptor Locus of commercial pure breeds, 2102 sows, including 723 Landraces, 120 Yorkshires and 1259 Durocs, were blood sampled from 19 breeding farms in year 2001 and 2002. The estrogen receptor (ESR) locus in swine was mapped at p-arm of chromosome one with two alleles, A and B. Literature indicated that BB



homozygotic sows produced 1.0 and 1.5 more piglets at birth and born alive, respectively than did AA homozygotes. And thus, B allele of ESR locus is generally recognized as prolific gene. Both mutagenically separated polymerase chain reaction (MS-PCR) technique tested and restriction fragment length polymorphism (RFLP) analysis were used to test each sample to increase the accuracy of results. The gene frequencies for prolific gene B allele were 0.07 for Landrace, 0.28 for Yorkshire and 0.010 for Duroc, respectively.

Key Words: Estrogen receptor, Gene frequency, Swine.

## 比較陣列語言 Matvec與Octave於遺傳育種之應用

比較陣列語言 Matvec與Octave於遺傳育種之應用

黃鈺嘉 林德育 廖仁寶 顏念慈 張秀鑾

行政院農業委員會畜產試驗所

應用陣列語言 Matvec與Octave 分別開發從選拔指數、混合模式、核酸序列分析DNA共有環帶分析的程式例集。Matvec 為 Wang and Fernando (1995)於依利諾大學(UIUC)開發的遺傳育種用高階矩陣語言，Octave 高階矩陣語言則為GNU 共享軟體，目前二者均提供Window與 Linux 可執行版供教學與研究使用下載。由於Matvec 從數量遺傳學觀點出發，故提供如近親係數計算、一般線性模式計算及變方成份估算等多種傳統數量遺傳專用的功能，但Octave 較多的字元處理函數功能及 Matlab m-file 相容的特色，有利於核酸序列資料處理，且可共享已開發的生物計算程式。遺傳育種研究者可結合此兩種類似語言的優點以提昇工作效率。

關鍵語：矩陣、育種、遺傳。

COMPARISON OF MATVEC AND OCTAVE LANGUAGES FOR  
GENETIC AND BREEDING PRACTICES

Y. C. Huang, D. Y. Lin, R. B. Liaw, N. T. Yen and H. L. Chang

Taiwan Livestock Research Institute, Council of Agriculture

For genetic and breeding practices, Matvec and Octave were used to develop program sets, which included programs of selection indices, generalized linear mixed model, genome sequence analysis and DNA bands summaries. Matvec was developed by Wang and Fernando (1995) at University of Illinois(UIUC). Octave was a GNU software. Matvec and Octave have both Window and Linux versions, which are free for research purpose. Because Matvec was developed from a quantitative geneticist point of view, therefore inbreeding coefficients, mixed models and variance components estimation were built-in elements. Octave with more functions for character and string operation is very handy for genome sequence analysis, and Octave is highly compatibility with m-files as of Matlab. Researchers can fasten together benefits of Matvec and Octave to achieve genetic and

breeding goals.

Key Words: Matrix, Genetics, Breeding.

## 第一號染色體微衛星型遺傳標記與經產母豬產仔性能之相關性研究

第一號染色體微衛星型遺傳標記與經產母豬產仔性能之相關性研究

廖仁寶 黃鈺嘉 張秀鑾 賴永裕 顏念慈 吳明哲

行政院農業委員會畜產試驗所

在豬隻第一號染色體上選擇八個微衛星型遺傳標記包括SW1514、SW552、SW2185、SW1301、SW373、SW780、S0316、SW2130，此八種標記在第一號染色體連鎖圖譜約佔140cM分摩根，篩檢157頭種母豬DNA基因型。三種產仔性狀包括總產仔數、活仔數及仔豬存活率被分析。基因型檢測結果每個遺傳標記之交替基因分布，皆有品種間的差異。以最小平方法分析母豬個別遺傳標記交替基因與其產仔性能之結果顯示：杜洛克母豬具 SW1514的交替基因B3(P)  
關鍵語：微衛星型標記、交替基因、產仔性能。

ASSOCIATION STUDY BETWEEN MICROSATELLITE MARKERS  
ON PIG CHROMOSOME 1 AND THE LITTER PERFORMANCE OF PAROUS SOWS

R. B. Liaw, Y. C. Huang, H. L. Chang, Y. Y. Lai, N. T. Yen and M. C. Wu

Taiwan Livestock Research Institute, Council of Agriculture

A total of eight microsatellite markers on swine chromosome 1 (SSC1) were used to genotype 157 parous sows. These markers including SW1514, SW552, SW2185, SW1301, SW373, SW780, S0316 and SW2130 spanned about 140 cM on the linkage map of SSC1. Three traits including the number of total piglets, the number of piglets alive and the survival rate of piglets were analyzed. The genotyping analysis indicated that the allele frequency of every marker differed among four breeds. When we further analyzed the litter performance of sows with different alleles by the least-square method showed that the number of total piglets born from Duroc sows with B3 allele were significantly more than those without such an allele, and so did B1 allele of SW1301. For Landrace sows with B5 allele of SW373 and Duroc sows with B3 allele of SW1514, the number of alive piglets were significantly more than that without such an allele. In the same way, the trait of litter performance of different breed sows with some alleles would be inferior to those without such alleles.

Key Words: Microsatellite marker, Allele, Litter performance.



## 總乳監測DHI牛群不良基因 I. 牛淋巴球黏力缺失症與單譜症基因

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林德育 黃鈺嘉 李世昌 張秀鑾 張菊犁 李素珍 曾青雲 陳志毅 吳明哲

行政院農業委員會畜產試驗所

遺傳檢測72個參加DHI牧場的總乳混合DNA，發現有65 場中仍至少有一頭母牛帶有淋巴球黏力缺失症((bovine leukocyte adhesion deficiency, BLAD)基因，但沒有發現任何牧場有雜合型的單譜症(Deficiency of Uridine Monophosphate Synthase, DUMPS) 泌乳牛。四個場的資料無法清楚的判讀 BLAD結果，其中兩場為直接採樣的新鮮總乳餘兩場為DHI乳品質檢測過的總乳，體細胞數分別為11.8、20.0、20.9、94.0萬/毫升。因此體細胞數、短期儲存與牛乳添加劑並非影響檢測靈敏度的主要因素。高頻率的BLAD雜合型提醒DHI計畫需持續宣導公牛與精液的篩選，總乳檢測方法可以監控牛群遺傳動態與降低檢測成本。

關鍵語：總乳、混合DNA、淋巴球黏力缺失症、單譜症。

## MONITORING DEFECT GENE OF DHI HERDS BY TANK MILK I. BLAD AND DUMPS ALLELES

D. Y. Lin, Y. C. Huang, S. C. Lee, H. L. Chang, C. L. Chang  
S. J. Lee, C.Y. Tseng, J.Y. Chen, and M.C. Wu

Taiwan Livestock Research Institute, Council of Agriculture

A genetic test screened DNA mixes of tank milk from 72 DHI herds. Results showed 65 herds had at least one cow carrying BLAD(bovine leukocyte adhesion deficiency) defect gene but none of 72 herds had any DUMPS (deficiency of uridine monophosphate synthase syndrome) carriers found. Four herds with uncertain typing results for BLAD test, two were extracted from fresh tank milk and the other two were from used DHI samples. The somatic cell counts were 118, 200, 209, 940 103/ml, respectively. Milk storage period, somatic cell counts and added preventives were not important factors for test sensitivity. The high frequency of BLAD carrier farms indicated continuous selection of TL (tested free of BLAD) bull and semen for breeding DHI cows is important. Genetic test by tank milk is an economic approach to monitor genetic status of dairy population efficiently.

Key words: Tank milk, DNA mixes, BLAD, DUMPS.

## 羊黏多醣症遺傳缺陷之DNA檢測

## 羊黏多醣症遺傳缺陷之DNA檢測

林德育 黃鈺嘉 魯學智 張秀鑾

山羊黏多醣症 (Mucopolysaccharidosis) 第三型，俗稱G-6-S，是一種遺傳缺陷所導致的代謝性疾病，且為一簡單的隱性基因遺傳。為初步瞭解該遺傳疾病在台灣羊隻的概況，以1998採集東部某一羊場的努比亞山羊種羊20頭(2公18母)、吐根堡山羊20頭及台灣土山羊21頭血樣DNA，共計61個樣品進行檢測，初步結果在努比亞山羊中高達25%(5/20)帶有此不良基因(雜合型)，而在所有檢測的吐根堡山羊與台灣土山羊皆為正常型。再採集該場2002年8月全場141頭努比亞山羊進行檢測，有15%(21/141)羊隻為雜合型個體，無有病型(隱性純合型)個體，顯示該不良基因存在於該羊場中之努比亞山羊族群中。由於努比亞山羊在台灣肉用山羊生產體系中扮演重要角色，了解此一不良基因在台灣羊群之頻率有其需要性。

關鍵語：山羊、頻率、黏多醣症。

DNA TYPING OF INHERITED DEFICIENCY OF CAPRINE  
MUCOPOLYSACCHARIDOSIS IIID

D. Y. Lin, Y. C. Huang, G. Lu and H. L. Chang

Taiwan Livestock Research Institute, Council of Agriculture

Caprine Mucopolysaccharidosis IIID, or N-acetylglucosamine 6-sulfatase deficiency (G6S), is a recessive inherited disorder in goat. To explore the impact of G6S on goat industry, a total of 61 samples collected from private goat farm of eastern Taiwan in 1998, were tested. Samples represented Nubian (18 females and 2 males), Toggenburg (16 females and 4 males) and Taiwan native goat (20 females and 1 male). Five carrier goats were found in 20 Nubian with frequency being 25%. No carrier was found in Toggenburg or Taiwan native goat. Further screen were performed by 141 blood DNA samples from all Nubian goats' of the farm in Aug. 2002. The frequency of carried was 15%(21/141) which explores risk of high frequency of G-6-S of Taiwan Nubians existed. No affected individual, homozygous recessive goat, was found in this trial. Nubian is one of the major resource goat breeds for meat production in Taiwan, and thus the corresponding frequency of G6S deserves to gain more attention.

Key Words: Goat, Frequency, Mucopolysaccharidosis.