

高產黑豬之選育 Breeding of Prolific Black Pigs



畜產試驗所高雄種畜繁殖場 許晉賓

Chin-Bin Hsu

Kaohsiung Animal Propagation Station, LRI, COA

1

大綱 Outlines

- ◆ 登記品種 Registered Breed
- ◆ 育種目的 The Purpose
- ◆ 選育方法 The Breeding Method
- ◆ 選育成果 The Breeding Results
- ◆ 用途與展望 The Prospects

2

申請登記名稱：高畜黑豬

Registered name：KHAPS Black Pigs

品種代號 Breed name：K

育種目的 The Purpose

1. 國人對黑豬肉普遍有特殊偏好，開發優良的黑豬品種與肉品，形成產品區隔，可保有市場競爭力。

Because of preference to pork of black pigs in Taiwanese society, breeding the excellent black pigs and developing characteristics products can maintain the market segmentation and increase the competitiveness.

3

2. 改善母豬年產仔豬頭數偏低問題(母性不良、繁殖障礙)。

Improving the question of lower number of annual reproductive piglets in sows (poor maternal, reproductive disorders)

3. 民間豬場的黑豬品種雜亂，黑豬毛色遺傳與肉質不穩定。

The breeds in native pig farms were confused, and the genetic variation in coat color and meat quality were instable.

4. 有優質的黑豬品種，具高產性、優良肉質，可創造高附加價值產品。

The excellent breed of black pigs, with the prolificacy and good meat quality, can create the high value-added products.

4

選育方法 Breeding Method

種原來源 Genetic sources



梅山豬 (Meishan pig)

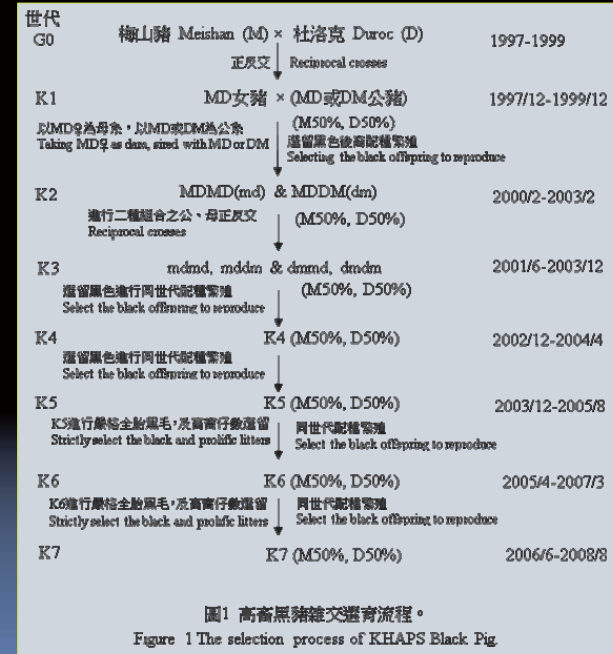
- 1994年自日本引進2公3母。 2 boars and 3 sows imported from Japan in 1994.
- 同窩出生仔數9頭以上，具有品種特徵。 Pigs from litter size born alive were over 9 heads were used.



杜洛克豬 (Duroc)

- 民間豬場，以購買精液方式取得種原。 Semen was purchased from breeding farm.
- 母豬選自同窩出生仔數10頭以上，ADG 0.52以上。 The ADG of Duroc sows were over 0.52 kg/d.
- 公豬選自檢定指數100以上、場內檢定ADG 0.56 kg以上，且同窩仔數10頭以上。 Duroc boars : ADG was over 0.56 kg/d, growth testing index was over 100.

X



6

評估性狀 Evaluated Traits

▲ 繁殖性狀 Reproductive traits

每窩分娩總仔數與活仔數、三週齡窩仔數與離乳窩仔數、仔豬出生、三週齡、離乳(30 d)體重、與三週齡育成率。

Litter size (birth, 3w, 30d), body weight (birth, 3w, 30d), survival rate on 30d.

▲ 生長性狀 Growth performance

70、120及210日齡之體重、210日齡背脂厚度、ADG、FE。

BW on d 70, 120, 210 of age; ADG (d70~210); FE (Feed/Gain)

7

▲ 體型性狀 Body conformation traits

210日齡測量體型性狀，項目包括：體長、體高、十字高、前幅、胸幅、後幅、胸深、胸圍、管圍、尾徑等性狀。

Evaluating the body conformation traits on d 210 of age.

▲ 出生毛色 Coat color

Recording coat color on birth (B, L, Q, R, and other)

▲ 多產基因(ESR)、緊迫基因檢測

Genotype identification of prolific gene (ESR) and Hal-1843 stress gene

8

選育成果

Breeding Results



品種特性 Breed Characteristics

表型特徵 Exterior characteristics :

▲ 耳大下垂，蹄黑。

Drooping large ears, black hoofs

▲ 體軀略短，肩窄，背直或略凹背，腹微下垂，胸腹深，屬中等體型豬種。

Short body length, narrow Shoulder width, little drooping abdomen, belong to medium size.

▲ 仔豬出生毛色為全黑或黑金斑，被毛疏而短。

Black coat color, hair is short and a little sparse.

繁殖性能 Reproductive performance

表1. 母豬各世代繁殖性能

Table 1 The reproductive performance of KHAPS Black Pig

性能 Traits	母豬世代 Generations of sow								
	G0 (MD reciprocal cross)		K1 (1-6 parity)		K2	K3	K4	K5	K6
	M ♀	D ♀	MD ♀ (× MD ♂)	MD ♀ (× DM ♂)					
No. of boars	12	24	49	30	31	25	27	11	10
No. of sows	53	42	92	88	116	89	107	30	22
No. of litters	50	40	165	154	192	158	197	67	45
Litters size at birth	11.6	9.2	12.5	12.7	11.1 ^a	10.9 ^a	9.8 ^b	11.3 ^a	11.2 ^a
Number born alive	9.4	7.2	11.3	11.2	10.1 ^a	9.7 ^{ab}	9.1 ^b	9.9 ^a	9.9 ^a
Litters size at d 21	8.5	6.6	10.1	10.2	9.2	8.9	8.5	9.4	9.5
Litters size at d 30	8.3	6.5	10.1	10.2	-	-	-	8.8	9.5

M: Meishan pig; D: Duroc pig; K: KHAPS Black Pig.

^{ab} Among generation K2~K6, means in the same row with different superscripts differ significantly (P < 0.05).

表2 高畜黑豬仔豬哺乳期性能

Table 2 The performance of KHAPS Black Pig

性能 Traits	Generations of piglets ³						
	K1 ¹		K2 ²		K5	K6	K7
	MD	DM	MD×MD	MD×DM			
BW at birth, kg	1.09±0.03	1.57±0.04	1.25±0.02	1.31±0.02	1.21±0.13	1.20±0.21	1.30±0.36
BW at d 21, kg	3.64±0.15	4.77±0.17	4.12±0.05	4.15±0.06	4.21±0.75	4.14±2.59	4.24±1.06
SURV at d 21, %	90.5±3.7	90.6±4.3	90.4±1.5	90.4±1.5	92.4±19.6	94.8±10.2	93.7±11.9
BW at d 30, kg	5.23±0.18	6.65±0.20	6.05±0.08	6.03±0.08	-	5.94±1.41	5.61±1.08
SURV at d 30, %	88.3±3.8	90.0±4.5	89.8±1.5	90.2±1.6	-	89.1±11.7	91.3±18.5

BW: Body weight; SURV: Survival rate.

¹ Data from 張等 (2002).

² Data from 張等 (2005).

³ Values are expressed as mean ± SE.



~59~

表3. 高畜黑豬第六與第七代生長檢定性能

Table 3 The growth performance of KHAPS Black Pig (K6 and K7)

性狀 Traits	K6				K7			
	公豬 Boars		女豬 Gilts		公豬 Boars		女豬 Gilts	
	M	SD	M	SD	M	SD	M	SD
No. of pigs	36		66		38		72	
Body weight, kg								
70d	17.7	2.8	17.8	3.1	20.0	3.3	18.8	3.4
120d	44.1	6.9	42.2	8.3	46.8	5.4	40.3	7.4
210d	99.9	12.4	89.6	13.3	104.9	10.3	89.9	13.2
Back fat (210d), cm	1.87	0.36	1.64	0.39	2.55	0.31	2.53	0.39
ADG, kg/d	0.62	0.10	0.53	0.11	0.65	0.10	0.55	0.10
FE (Feed/Gain)	3.0	0.4	--	--	2.77	0.33	--	--

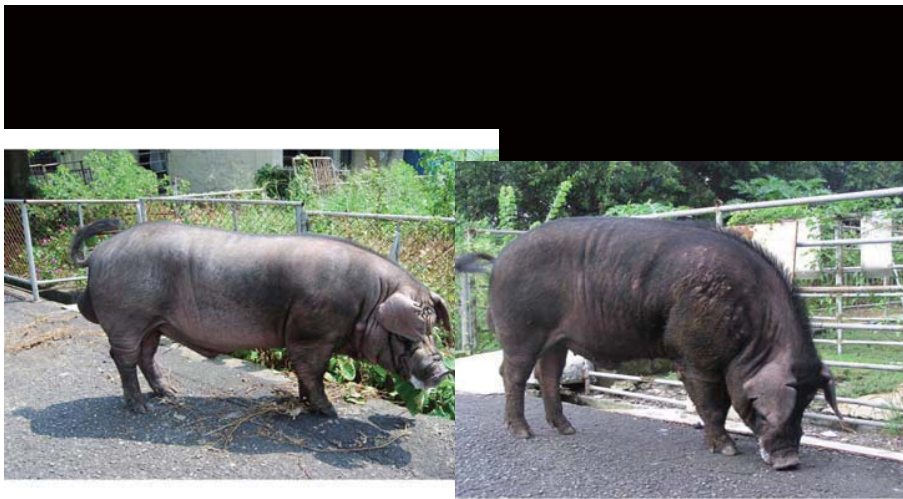
M: Mean; SD: Standard deviation

表4. 高畜黑豬第六與第七代之210日齡體型性狀

Table 4 The body conformation of KHAPS Black Pig at 210 days of age (K6 and K7)

性狀 Traits	K6		K7	
	公豬 Boars	女豬 Gilts	公豬 Boars	女豬 Gilts
No. of pigs	36		66	
Withers height, cm	65.9 ± 3.9	62.0 ± 3.6	65.4 ± 2.6	63.1 ± 3.2
Rump height, cm	70.4 ± 4.3	67.9 ± 4.1	69.6 ± 4.9	68.7 ± 3.9
Body length, cm	123.9 ± 5.9	119.1 ± 7.3	121.3 ± 8.6	117.2 ± 6.4
Chest circumference, cm	102.9 ± 6.0	101.3 ± 6.8	108.1 ± 5.8	104.5 ± 5.6
Front leg circumference, cm	19.2 ± 2.0	17.9 ± 1.8	18.9 ± 2.2	17.6 ± 1.6
Tail circumference, cm	13.6 ± 2.1	12.6 ± 2.0	12.4 ± 1.5	12.3 ± 1.7
Shoulder width, cm	29.7 ± 2.7	27.9 ± 2.3	31.9 ± 4.0	28.9 ± 2.6
Rump width, cm	27.6 ± 1.5	26.8 ± 2.2	29.1 ± 2.4	28.0 ± 2.5
Chest width, cm	27.2 ± 2.1	26.0 ± 2.1	29.6 ± 3.7	27.0 ± 2.6
Chest depth, cm	34.2 ± 2.8	34.0 ± 2.6	36.3 ± 1.5	35.6 ± 2.2

Values are expressed as mean ± SD.



512-3 (K7) ♂

159-9 (K6) ♂



母豬乳頭數均有七對以上
Sows having over 7 pairs of teats were selected.

表5. 梅山豬與杜洛克豬雜交仔代毛色分離情形

Table 5 The segregation of the coat color of KHAPS Black Pigs

配種組合 Mating type ¹	胎數 No. of litters	仔代毛色比例 (%) Coat color of offspring, % ²			
		黑金斑 L	全黑 B	紅金斑 Q	全紅 R
M×M	16		100 (166)		
D×D	13				100 (75)
M×D & D×M	81	36.5 (259) ³	62.3 (442)	0.1 (1)	0.8 (7)
K1(B)×D(R)	34	30.7 (112)	27.3 (100)	14.0 (51)	28.0 (102)
K1(B)×K1(B)	333	17.4 (596)	58.1 (1989)	13.5 (463)	10.8 (371)
K2(B)×K2(B)	184	12.1 (215)	76.9 (1365)	5.4 (96)	5.5 (98)
K3(B)×K3(B)	140	8.3 (107)	81.9 (1055)	3.3 (42)	6.5 (84)
K3(R)×K3(R)	15			33.1 (47)	66.9 (95)
K4(B)×K4(B)	69	4.4 (27)	86.9 (535)	2.0 (12)	6.8 (42)
K5(B)×K5(B)	67	9.0 (61)	85.3 (577)	3.4 (23)	2.2 (15)
K6(B)×K6(B)	49	6.6 (32)	93.4 (455)	0 (0)	0 (0)

¹ The prior abbreviation letter of the mating type represented the breed of sow, and the hind letter represented the boar.

² Coat color was classified into black (B), golden longitudinal stripes of black (L), golden longitudinal stripes of red (Q), and red (R).

³ Number in the parenthesis represented the number of pigs.

圖2. K7代仔豬毛色分佈比例
The segregation of the coat color

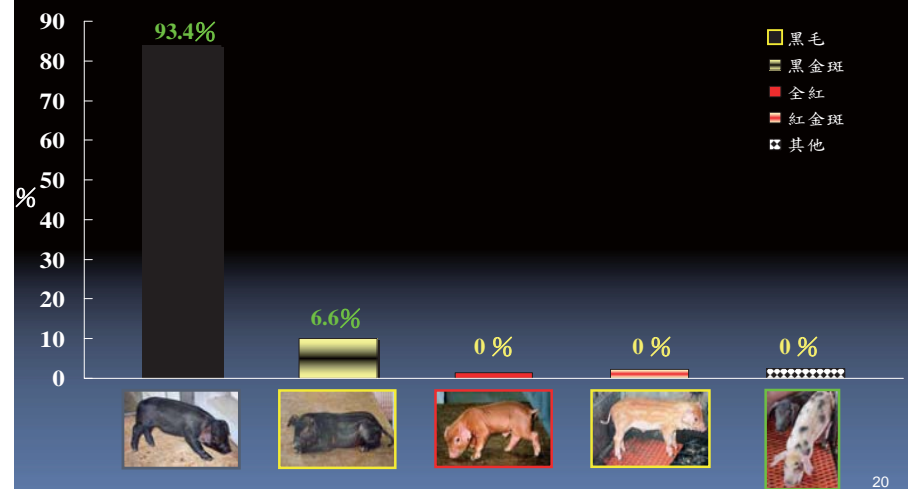


表6. 高畜黑豬K6與K7留種豬之基因型比例
The genotype percentage of K6 and K7 breeding pigs

	基因型 genotype	比例, % percentage
多產基因(ESR)	MM	100
緊迫基因 Hal-1843 stress gene	AA	100

21

表7. K5代高畜黑豬在不同屠宰體重之屠體性狀
Table 7. The carcass traits of KHAPS Black Pig (K5) at different slaughter weights

Traits	90-100 kg	100-110 kg	110-120 kg
No. of pigs	8	6	7
Average age, day	282	290	299
Slaughter weight, kg	93.0 ±	104.4 ± 3.5 ^b	115.1 ±
Carcass weight, kg	77.3 ±	85.8 ± 5.6 ^b	95.7 ±
Carcass length, cm	76.6 ± 2.7 ^b	81.2 ±	83.6 ±
Backfat thickness, cm	2.7 ± 0.5	2.5 ± 0.7	2.6 ± 0.7
Loin eye area, cm ²	29.6 ± 5.6	31.3 ± 5.0	34.4 ± 11.5
Dressing percentage, % ^y	83.1 ± 2.6	82.2 ± 3.2	83.1 ± 2.4
Lean percentage, % ^y	42.9 ± 3.5	42.9 ± 3.7	43.1 ± 3.5
Fat percentage, % ^y	18.7 ± 4.6	17.9 ± 8.5	17.8 ± 5.0
Bone percentage, % ^y	14.7 ± 0.7	14.9 ± 2.0	15.1 ± 1.6

Values are expressed as mean ± SD.

^{a,b,c} Means in the same row with different superscripts differ significantly ($P < 0.05$).

22

~19~

Table 8. The reproductive performance of field test 1 in KHBPS Black Pig (K4)

Items	Reproductive performance ¹
The 1st parity of reproductive performance (mated with boars)	
No. of sows	11
Pigs total born	10.8 ± 3.7 (5~17) ²
Pigs born alive	9.3 ± 2.4 (5~13)
Percentage of black coat color in piglets, %	83.3
The 2nd parity of reproductive performance (mated with Duroc or crossbred black boars)	
No. of sows	9
Pigs total born	13.6 ± 2.7 (10~18)
Pigs born alive	11.6 ± 1.9 (9~15)
Percentage of black coat color in piglets, %	87.5
Average reproductive performance of two parities	
Pigs total born	12.1 ± 3.5
Pigs born alive	10.3 ± 2.4
Percentage of black coat color in piglets, %	85.5
Litter size at 21 d of age	9.2 ± 2.1
Survival rate at 21 d of age, %	90.8
Birth weight, kg	1.3 ± 0.3

Table 9. The reproductive performance of field test 1 in KHBPS Black Pig (K5)

Items	Reproductive performance ¹ (mated with , Duroc or crossbred black boars)
No. of reproductive records	17
Pigs total born	12.1 ± 2.5 (7~19) ²
Pigs born alive	11.4 ± 1.6 (7~13)
Percentage of black coat color in piglets, %	95.9
Litter size at 21 d of age	10.5 ± 1.6
Survival rate at 21 d of age, %	92.0 ± 7.7
Birth weight, kg	1.3 ± 0.4
Body weight at 21 d of age, kg	7.5 ± 1.9

¹ Data expressed as mean ± SD.

² The values in parenthesis mean the distribution of litter size.

24

Table 10. The carcass characteristics of K × B crossbred offsprings

Items	
No. of pigs	30
Average age, days	245 ± 6.9
Slaughtered weight, kg	116.0 ± 10.5
Carcass weight, kg	95.2 ± 8.7
Carcass length, cm	83.1 ± 2.5
Pair of ribs	14.5 ± 0.5
Average backfat thickness, cm	2.8 ± 0.6
Dressing percentage, %	83.1 ± 1.5
Color score of <i>Longissimus dorsi</i> muscle	2.9 ± 0.4
Marbling score	1.9 ± 0.5

K: KHBPS black sows; B: Berkshire boars.
Data expressed as mean ± SD.

25



~ 62 ~

K × F(民間大黑豬)之肉豬

Hogs of K × F(Native large black pigs)



Table 11. The carcass characteristics of D × K crossbred offsprings

Items	
No. of pigs	12
Average age, days	213 ± 6.1
Slaughter weight, kg	121.6 ± 11.8
Carcass weight, kg	104.2 ± 9.9
Carcass length, cm	84.7 ± 2.9
Pair of ribs	14.8 ± 0.4
Average backfat thickness, cm	2.6 ± 0.3
Dressing percentage, %	85.7 ± 1.0
Lean, %	49.6 ± 2.7
Fat, %	19.7 ± 3.0
Bone, %	14.3 ± 0.8
Loin eye area, cm ²	31.7 ± 0.4
Meat color score	2.8 ± 0.6
Marbling score	2.7 ± 0.6

D: Duroc sows; K: KHBPS black boars.
Data expressed as Mean ± SD.

28

杜洛克 × 高畜黑豬之雜交豬

D × K hogs



肉色與大理石紋之判定
Meat quality evaluated

~ 63 ~

用途與展望 The Prospects

◆ 作為母系種豬以雜交生產黑毛肉仔豬：

高畜黑豬母性優良，具高繁殖力，適合作為母系種豬，以供選配性能優良之大型公豬，以繁殖黑毛肉仔豬。

The KHAPS Black Pig has the potential to be the dam to cross reproduce the black hogs.

◆ 純種繁殖，以生產高畜黑豬肉豬：

進行純種繁殖以生產黑毛種豬與肉豬，適合小規模繁殖飼養，分散經營風險。

Pure breed of reproduction to reproduce the K pigs.

◆ 以特色化經營飼養，提高產品附加價值：

保有50%梅山豬血統，有其特殊品種特色，可搭配鄉土在地特性及利用農副產物進行特色化飼養，生產高價值肉品與加工製品。適合休閒農場、小型牧場飼養，或參加生產履歷認證、策略聯盟，具有明確市場區隔。

Through characteristic feeding, creating the high value-added products.

