

Research and Development of Goat Industry in Taiwan

Jang-Chi Huang, Ph. D.
Director, Hengchun Branch,
Livestock Research Institute, COA,
Executive Yuan, Taiwan
jchuang@mail.tlri.gov.tw

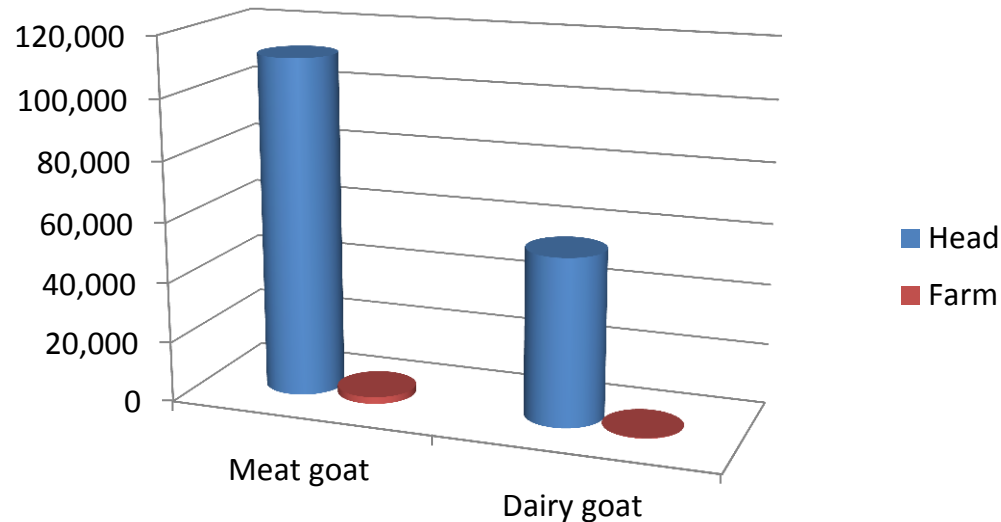
Outline

- **Overview of goat production**
- **Highlights of goat research**
- **On-going research projects**

Overview of goat industry

Goat production and farming scale

	Goat	Farm	Scale (Head/Farm)
Meat goat	111,765	2,295	48.6
Dairy goat	55,338	323	171.3



Evolution of meat goat industry

Before 1980s

- Grazing on range land
- Small scale
- Mostly indigenous crosses
- Less efficient



After 1980s

- Confinement completely
- Commercialized, highly intensiveness
- Introduction of Anglo Nubian and Boer for upgrading



Main breeds of meat goat

- Nubian and its upgraded crosses
- Upgrading since 1980s
- Share over 70% of local goat meat



Alternative source of local chevon

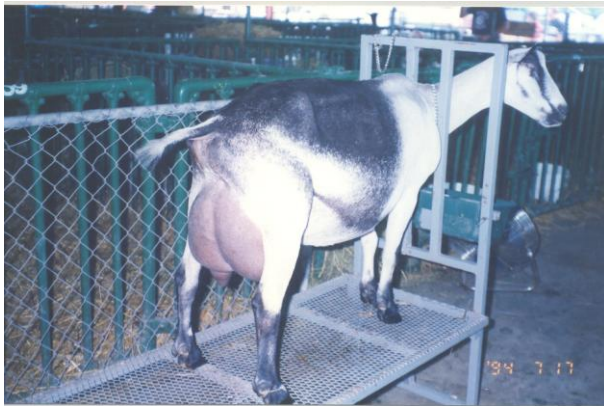
-Castrated dairy male

- Share 30% of domestic chevon
- Boer goat crosses is not popular so far, but is increasing



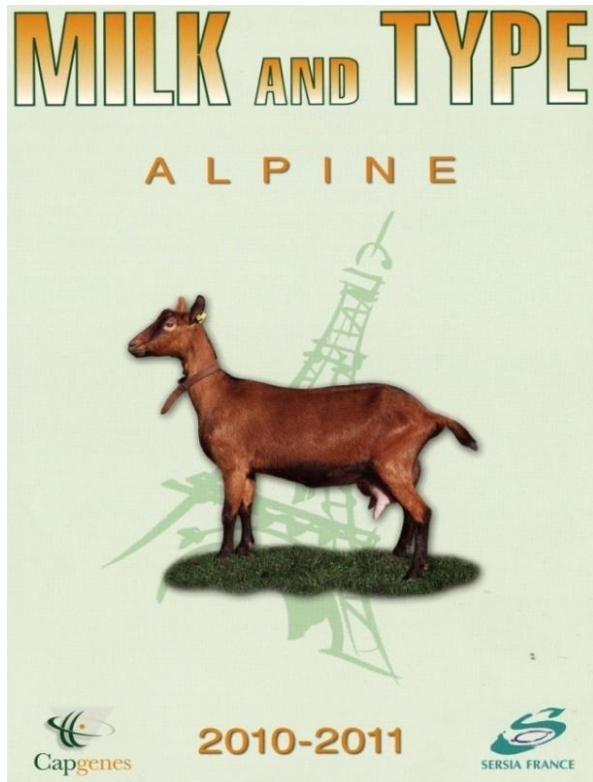
Main dairy breeds

- Alpine is the dominant breed, over 80% of dairy goat
- Mostly originated from USA and Australia in 1980s
- tropical lines of temperate breeds



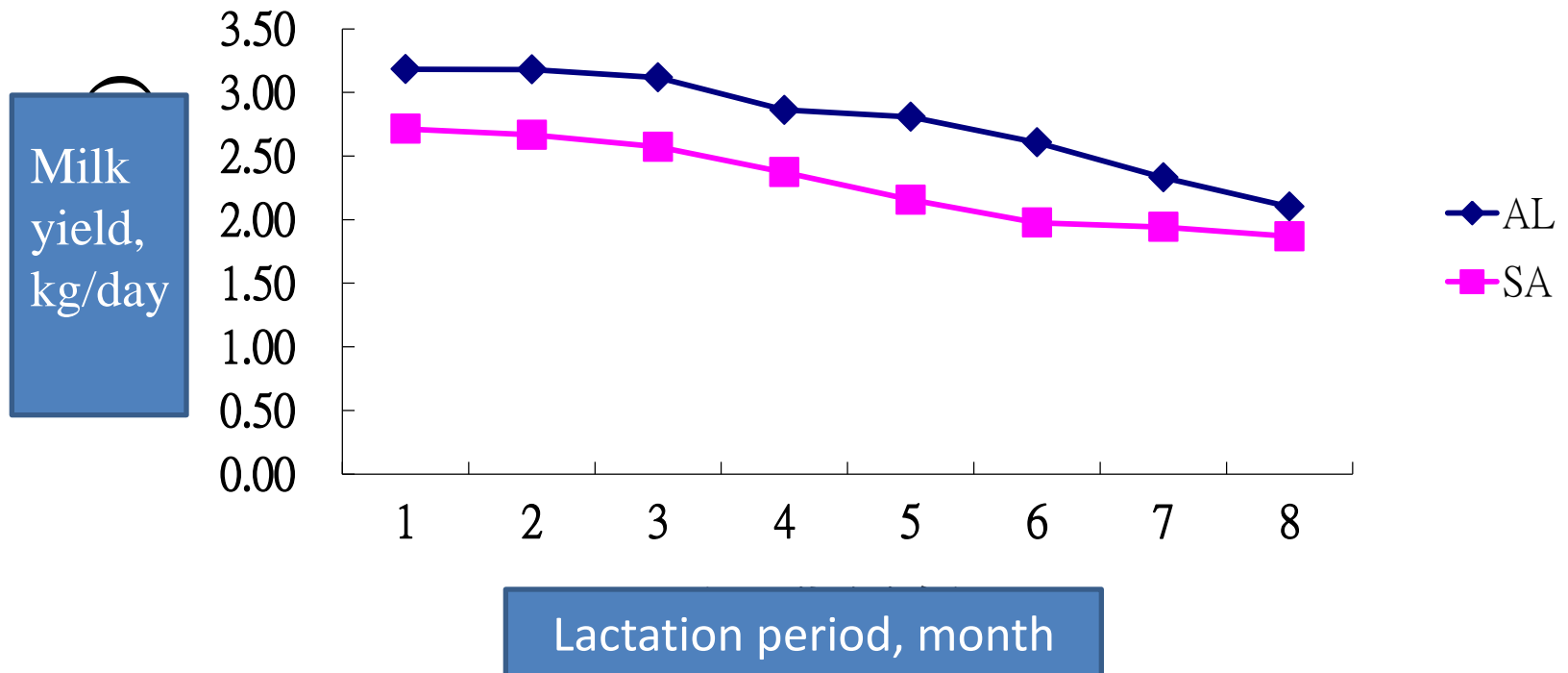
Genetic improvement

- AI with French semen of proven bucks



Performance of lactation

--Does with **over one ton of milk yield** in a 250 day of lactation period **are not rare**





Management of goats

- Completely **confined indoor** on elevated and slatted floor
- Management is **highly intensive and efficient**



Typical goat farms



Facilities for relief of heat stress



Treatment of the wastes

- Feces are separated from urine
- Collected and removed by conveyor for compost



Appraisal of dairy goat farms



97年度 優良乳羊場證書

證號：(97)中華羊協第386號

鄧翁秋月女士 位於嘉義縣民雄鄉
才昌畜牧場，經本協會台灣羊乳推廣委員會總評鑑
結果，獲選為97年度台灣地區優良乳羊場。

此 證



中華民國養羊協會理事長 張福隆

台灣羊乳推廣委員會主任委員 黃琮琪

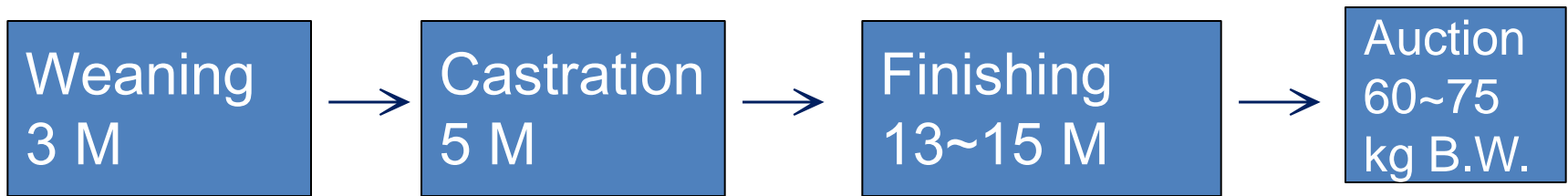
中華民國九十七年十二月十七日

Award a certificate
to the farm owner

Show and sale of breeding goat



Systemic production and marketing



Marketing of local chevon

- Slaughtering in 3 abattoirs
- Sale in restaurants only
Not available in supermarket



Certification of local chevon

- 53 Certified restaurants currently



Taiwan Fresh Goat Meat
國產羊肉



Milk processing and marketing

- Processing: 70% by milk plants, 30% on farm.
- Warm milk only, home delivery daily.
- Not available in supermarket .



Certification of fresh goat milk

--by sticking the GGM stickers

- Since 2001
- Over 70% of fresh goat milk are certified
- Over 450 million stickers have been issued up to the end of 2011



Highlights of Research

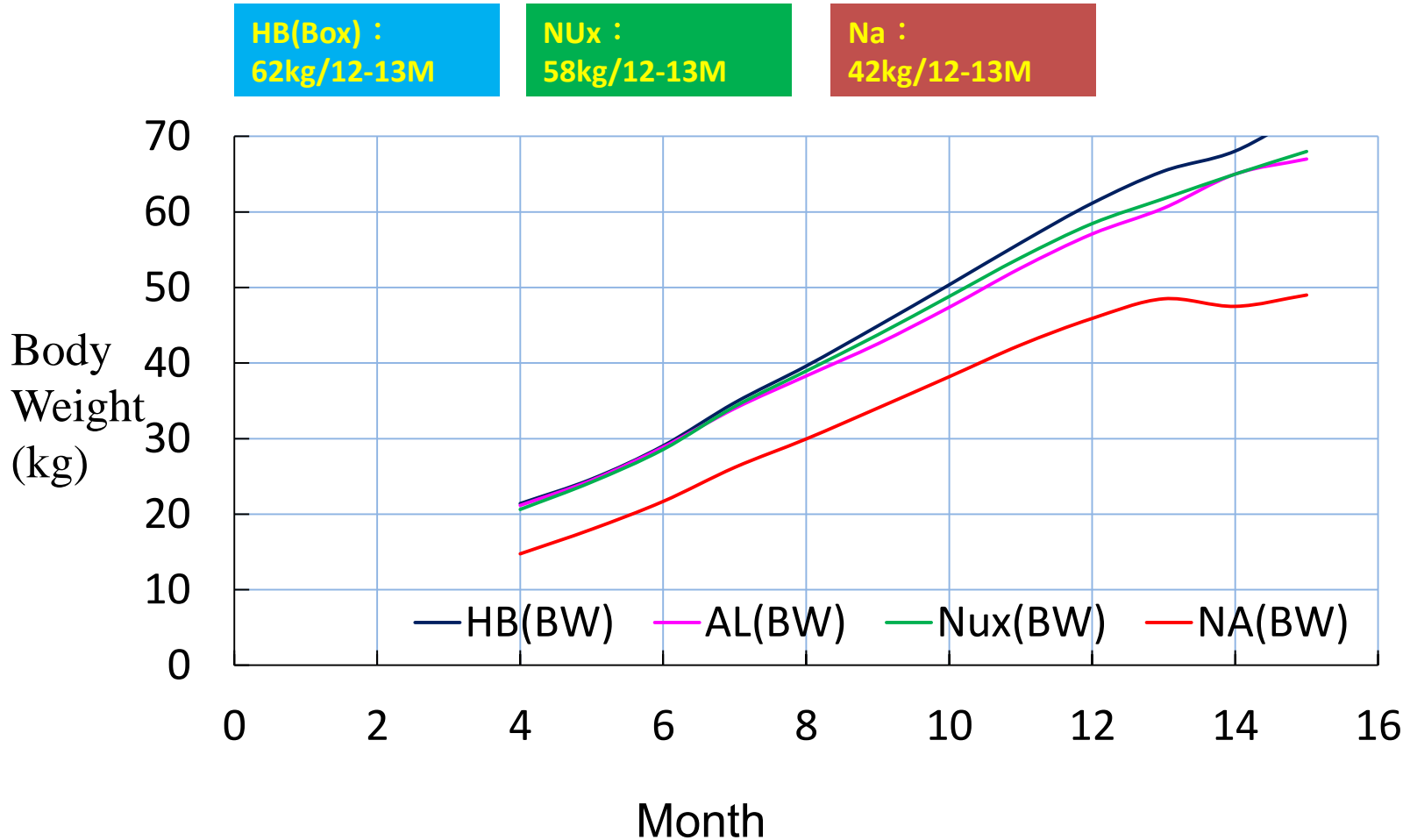
Selection of new breed with black coat

- The Hengchun Black Goat

- **Upgrading** of Nubian crosses by Black Boer to consist of **87.5% of Boer**
- Meaty, hardy and high growth performance
- A new breed is expected to nominate in 2014



Optimal age and body weight for slaughtering



Feeding of agricultural by-products

- Copra for dairy goat, for example

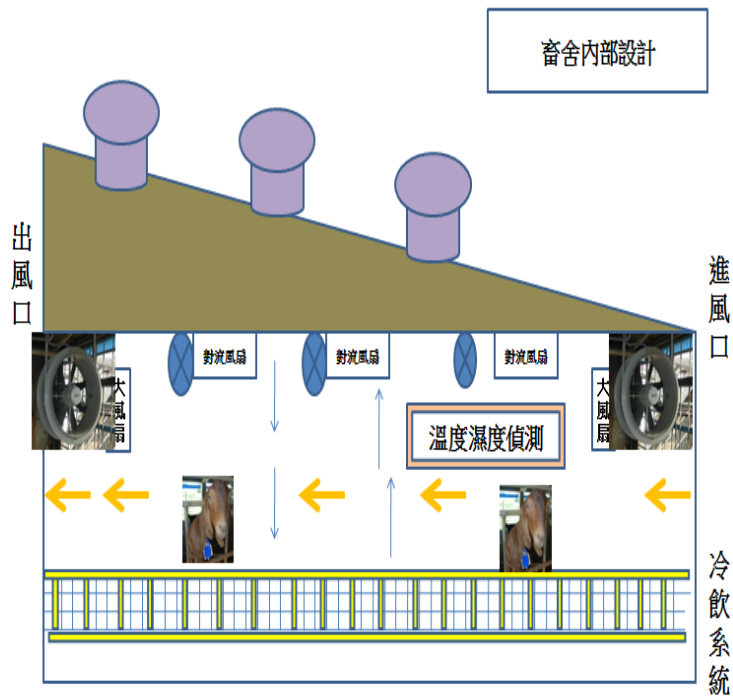
	Addition ratios of copra meal in diets				SEM
	0%	8%	16%	24%	
DMI, kg/d	2.09a	1.96ab	1.94ab	1.76b	0.09
Milk yield, kg/d	2.97	2.67	2.80	2.59*	0.15
Milk lactose, %	4.32a	4.16b	4.20ab	4.14b	0.04
MUN, mg/dL	40.0a	34.9b	35.4b	36.0b	1.32



Feeding of agro-byproducts to meat goat

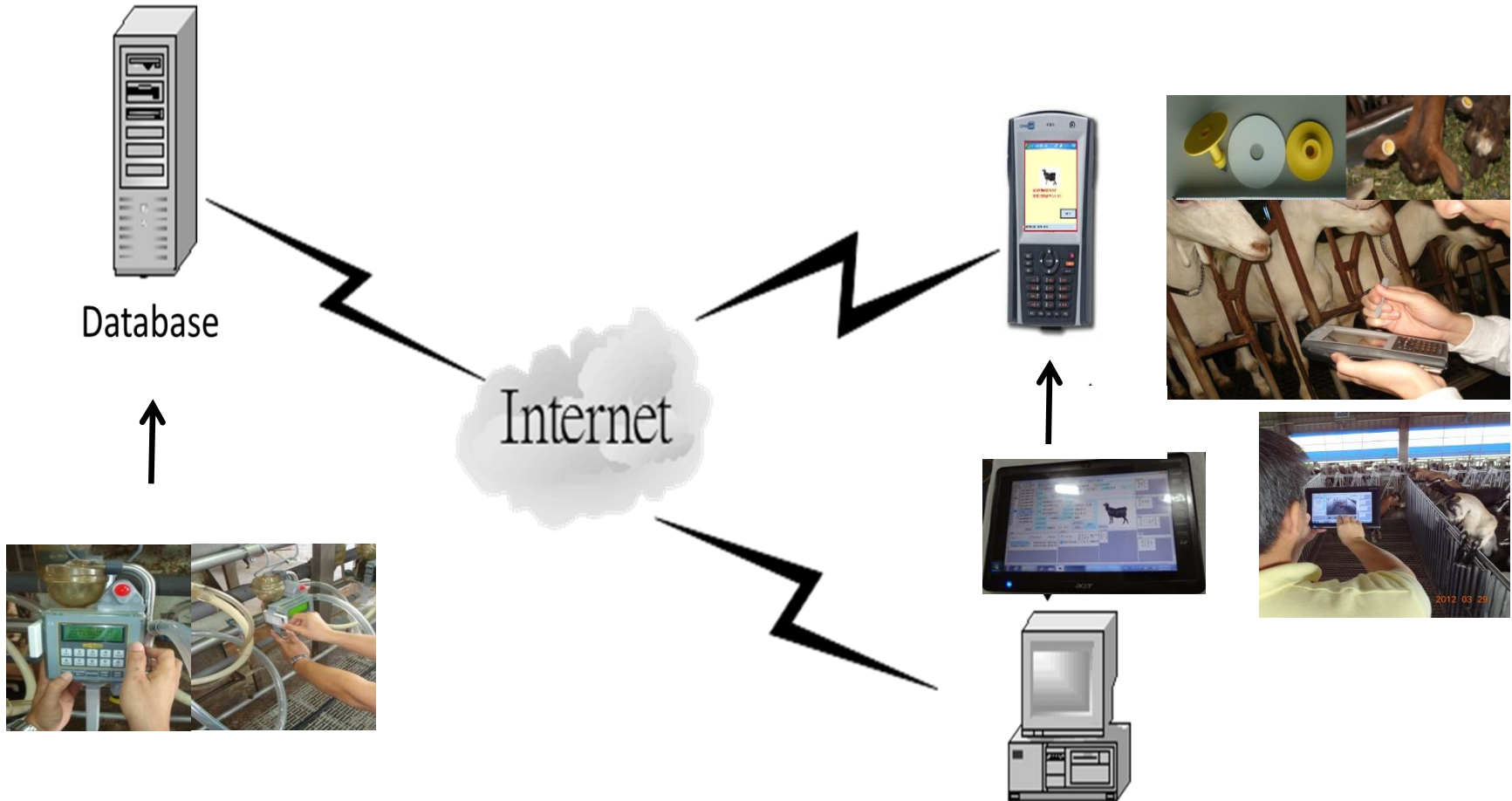
Group	Formula of Ration (%)			Growth rate and cost	
	By-products	Concentrates	Grass or alfalfa Hay	ADG (kg)	Cost (NTS/kg gain)
Control	-	70	30	0.12	64.0
Peanut stover	60	20		0.07	47.8
Bagasse	6	69	25 (alfalfa)	0.19	37.0
B+ Brewer' s grain	30	70		0.16	39.5
Corn+Do-fu pulp	29	57	14 (alfalfa)	0.10	57.8
Corn+ B.G.	54	21	25 (alfalfa)	0.13	28.6

Monitoring and cooling system for goat house



Digital management and data collection

- A paperless management system



Estrus induction in non-breeding season

- Photoperiod and pheromone in stead of hormonal control resulted in 90% of conception rate



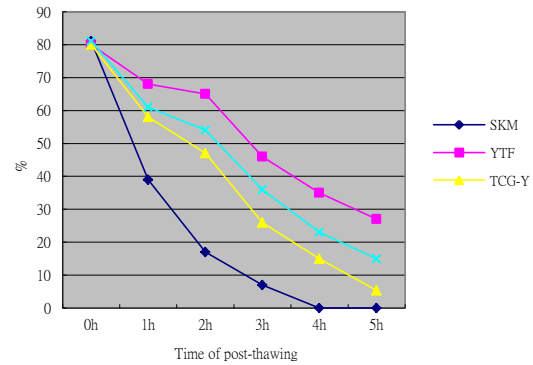
Perfume with pheromone



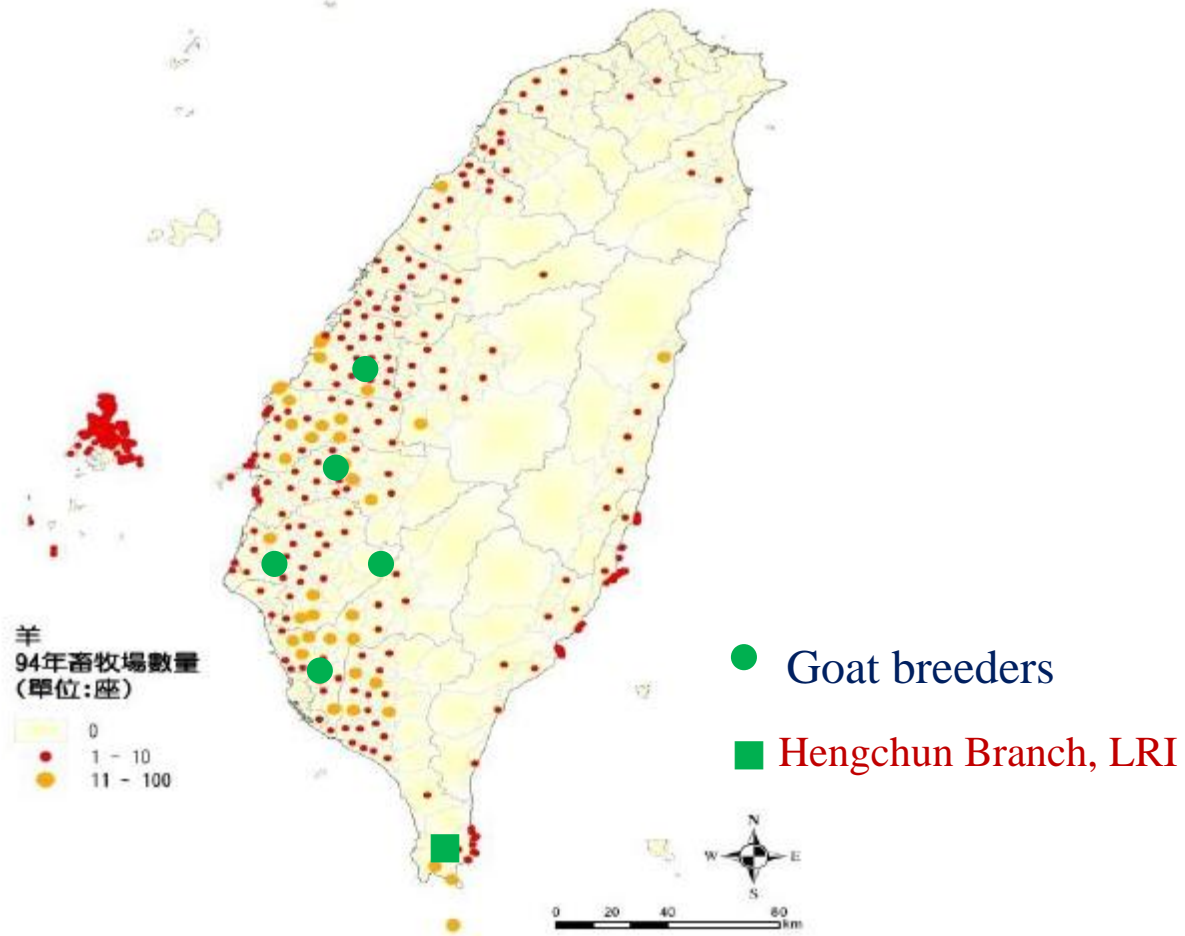
Vocalization

Cryopreservation of semen and AI

- Research and application

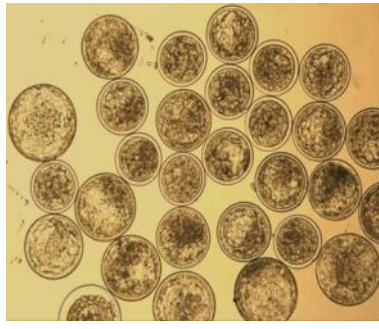


Network of the goat semen provider



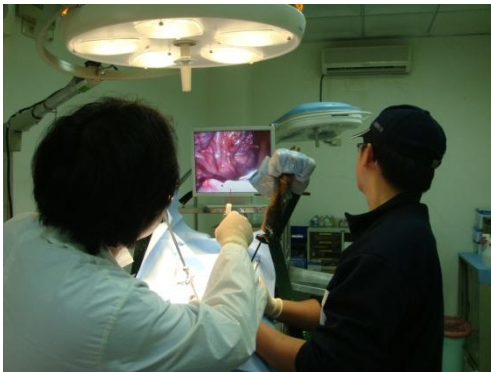
Embryo Transfer

- Develop flushing needle and technique
- Technique transfer for commercial application

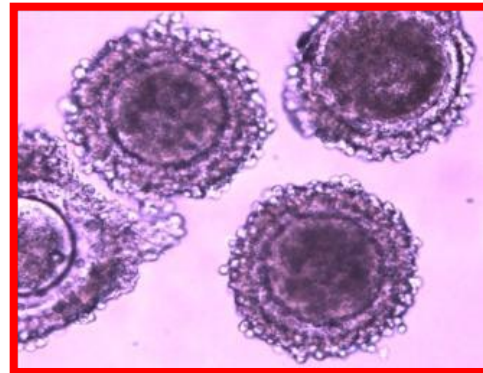


In vitro Production of goat embryos

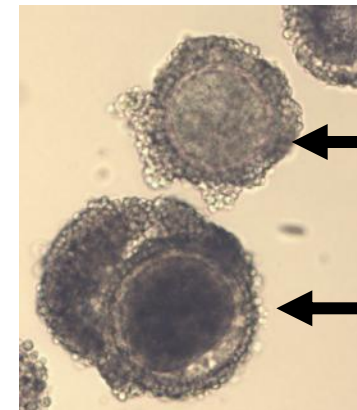
- Oocytes collected by ovum pick-up or from slaughter house
- IVM, IVF, IVC



OPU



COCs



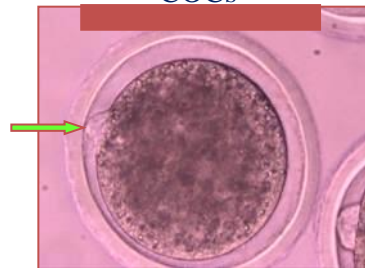
BCB-

BCB+

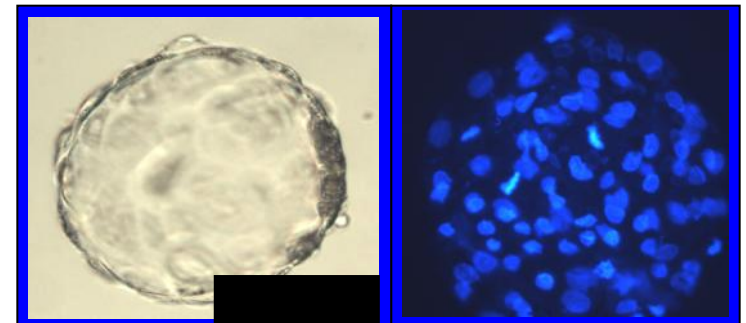
Selection and IVF



Ovaries



Matured oocyte in IVM



IVC

Developmental competence of goat IVP embryos derived from immature oocytes

No. of fertilized oocytes	No. of cleavage oocytes (%)	Blastocysts No. (%)	Cell count
135	99(72.5±11.9)	91(66.3±10.9)	172.1±58.5

Success rate after transfer of vitrified-thawed IVP goat embryos

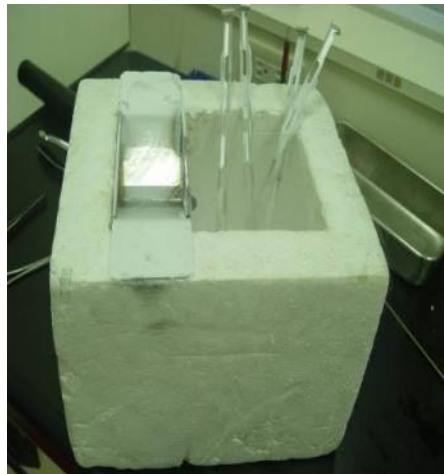
Number of recipients(embryos)	Number of pregnant(%)	Number of kidding(%)	Number of kids born(%)
16(32)	13(81.3)	9(56.3)	15(46.9)

Cryopreservation of goat embryos

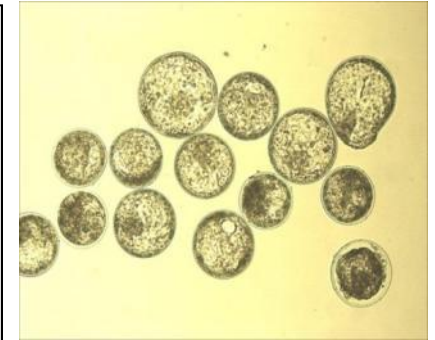
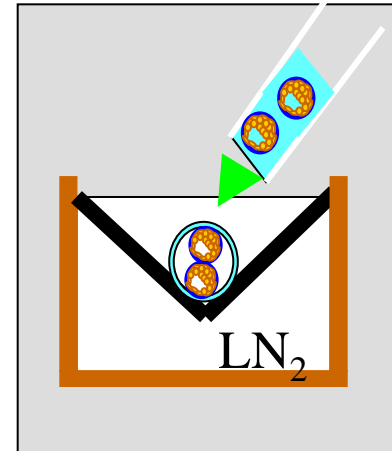
- Vitrified in 2 μL of microdrop
- Patent technique and device



Slow freezing

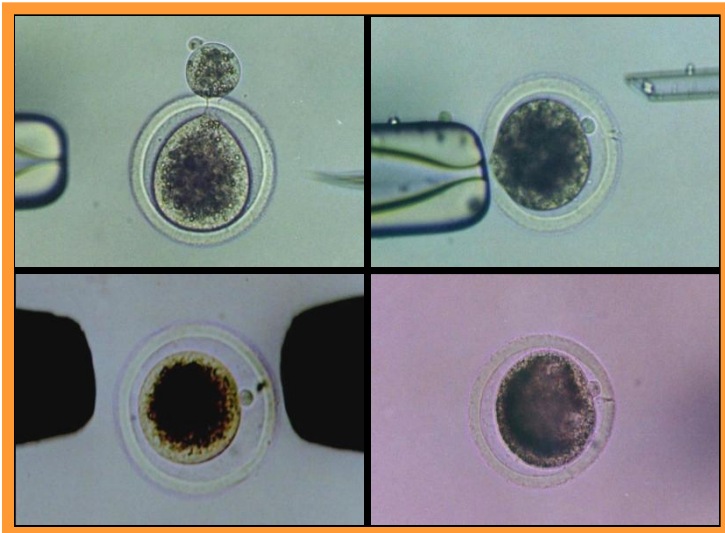


Vitrification



Cloning and transgenic goat

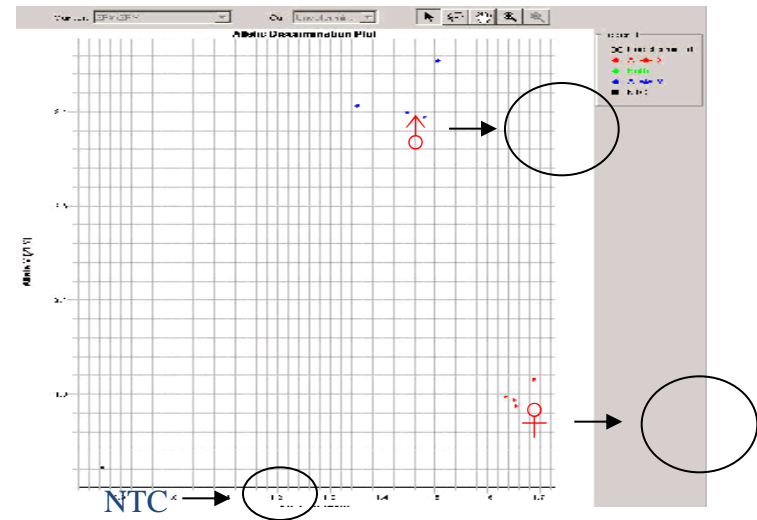
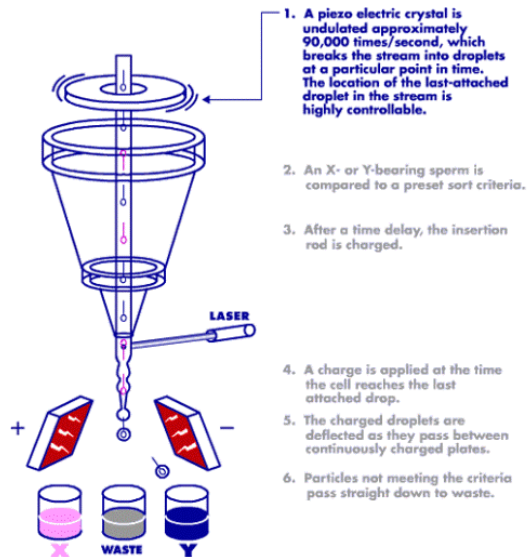
- Nuclear transfer
- Transgenic goats carrying gene Factor 8 in 2004



Ongoing Research

Pre-selection of goat gender

- By flowcytometry for sperm sorting
- By DNA probe (ZFX/ZFY) for embryos



Gene markers related to growth traits

Candidate genes

- Growth hormone gene (GH)
- Insulin-like growth factor (IGF) & Insulin-like growth factor binding protein (IGFBP)
- Myostatin gene (MSTN)

Cheese Processing

- Added value of goat milk
- Adapt to oriental taste





Thank you
for your
attention

'99 4 24