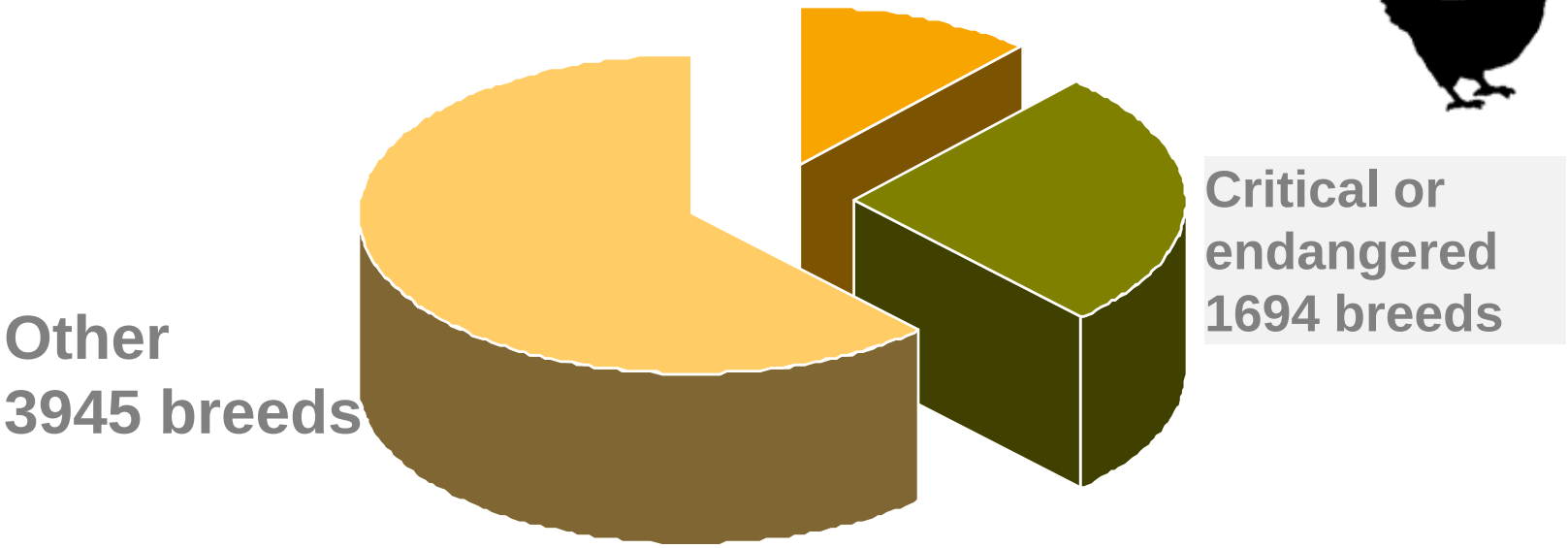
9.	PROGRAM BREEDING TERNAK RUMINANSIA DI DAERAH TROPIS DAN SUB TROPIS	Perbandingan penerapan program *breeding* ternak ruminansia dalam peningkatan kualitas genetik ternak di Indonesia dan dunia
10.	PROGRAM BREEDING TERNAK NON-RUMINANSIA DI DAERAH TROPIS DAN SUB TROPIS	Perbandingan penerapan program *breeding* ternak non-ruminansia dalam peningkatan kualitas genetik ternak di Indonesia dan dunia
11.	*GENETIC CONSERVATION*	Program pelestarian ternak asli dan lokal Indonesia (eks situ, in situ, laboratorium)
12.	PEMBENTUKAN BANGSA BARU	Pembentukan bangsa baru (ternak ruminansia dan non-ruminansia)
13.	APLIKASI BIOTEKNOLOGI DALAM PEMULIAAN TERNAK	Kemajuan genetik dengan aplikasi bioteknologi
14.	DISKUSI KELOMPOK (III)	Penyusunan makalah tentang materi yang telah diberikan (Materi VI-X)
15.	DISKUSI KELOMPOK (IV)	Penyusunan makalah tentang materi yang telah diberikan (Materi VI-X)
16.	**UJIAN AKHIR SEMESTER**	

PEMULIAAN TERNAK NON RUMINAN APLIKASI di TROPIS dan SUB TROPIS

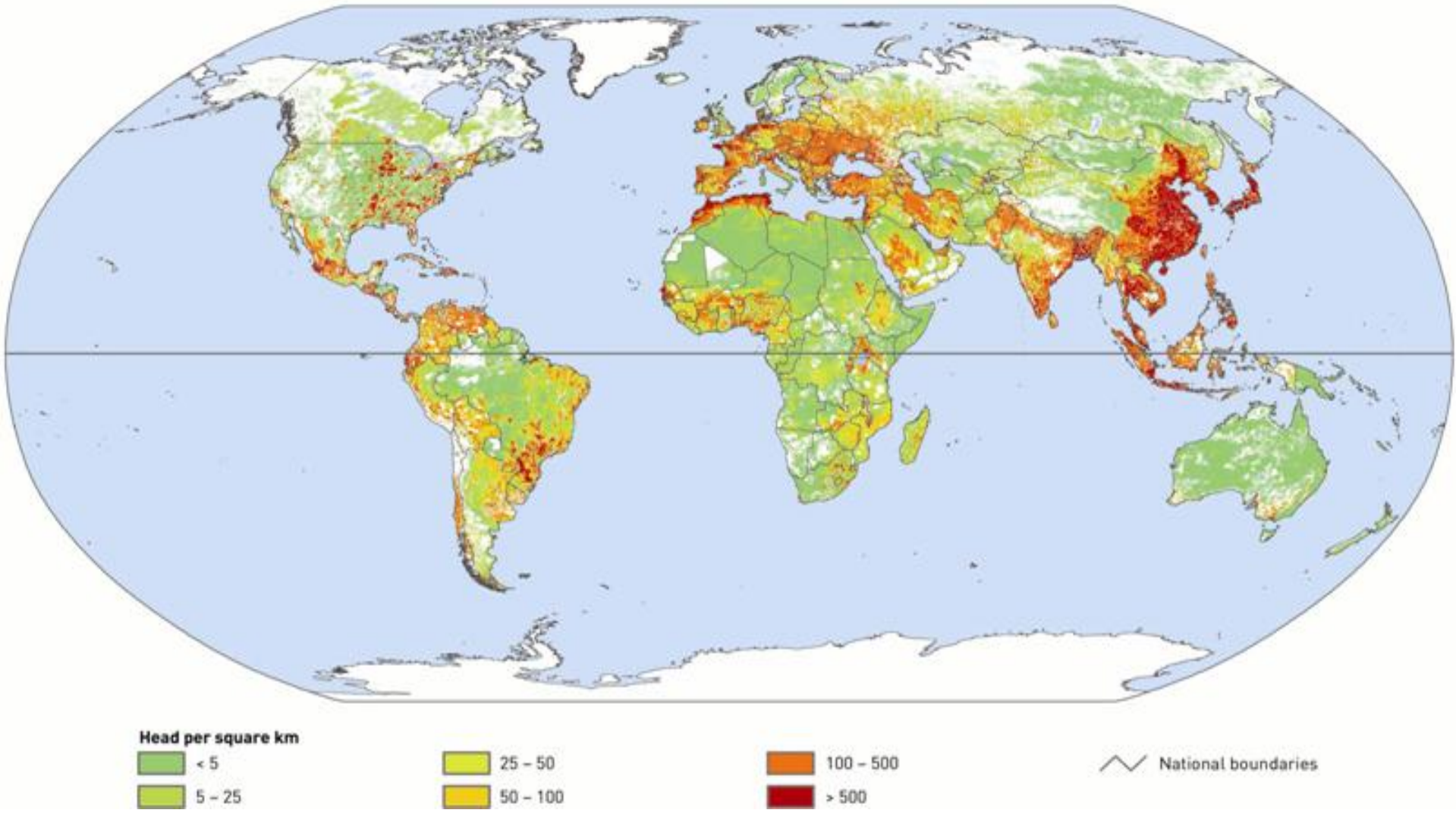
Livestock and poultry breeds, globally

6,379 livestock and poultry breeds

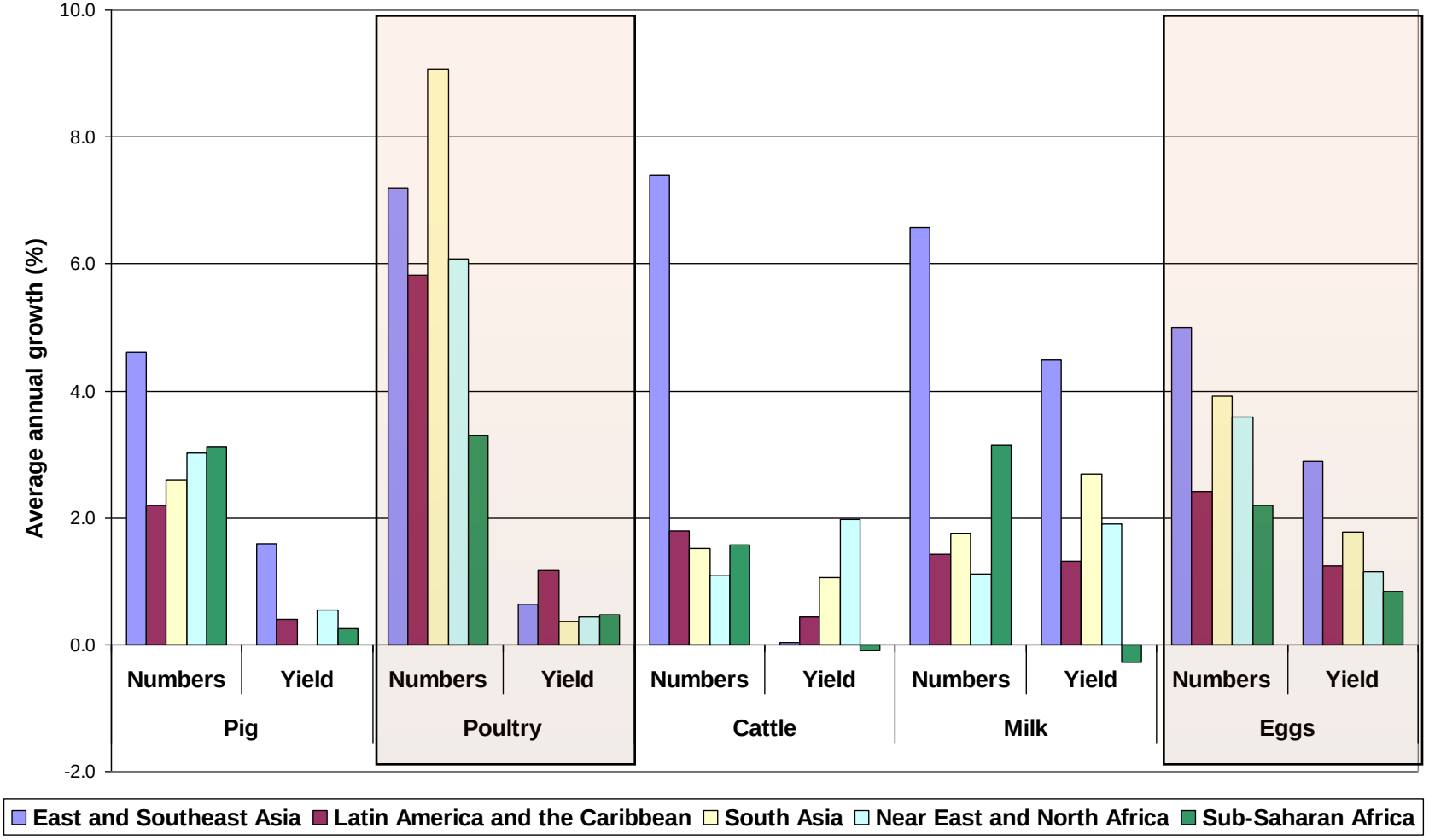


Source: FAO (2007)

Estimated global distribution of poultry



Growth in production: animal numbers and yields



(1980-2007)

CONCEPTS ON BIOTECHNOLOGY

Conventional Breeding

- limited to exchanges between the same or very closely related species
- little or no guarantee of obtaining any particular gene combination from the millions of crosses generated
- undesirable genes can be transferred along with desirable genes
- take a long time to achieve desired results

Genetic Engineering

- allows the direct transfer of one or just a few genes, between either closely or distantly related organisms
- improvement can be achieved in a shorter time compared to conventional breeding

SCOPE OF BIOTECHNOLOGY

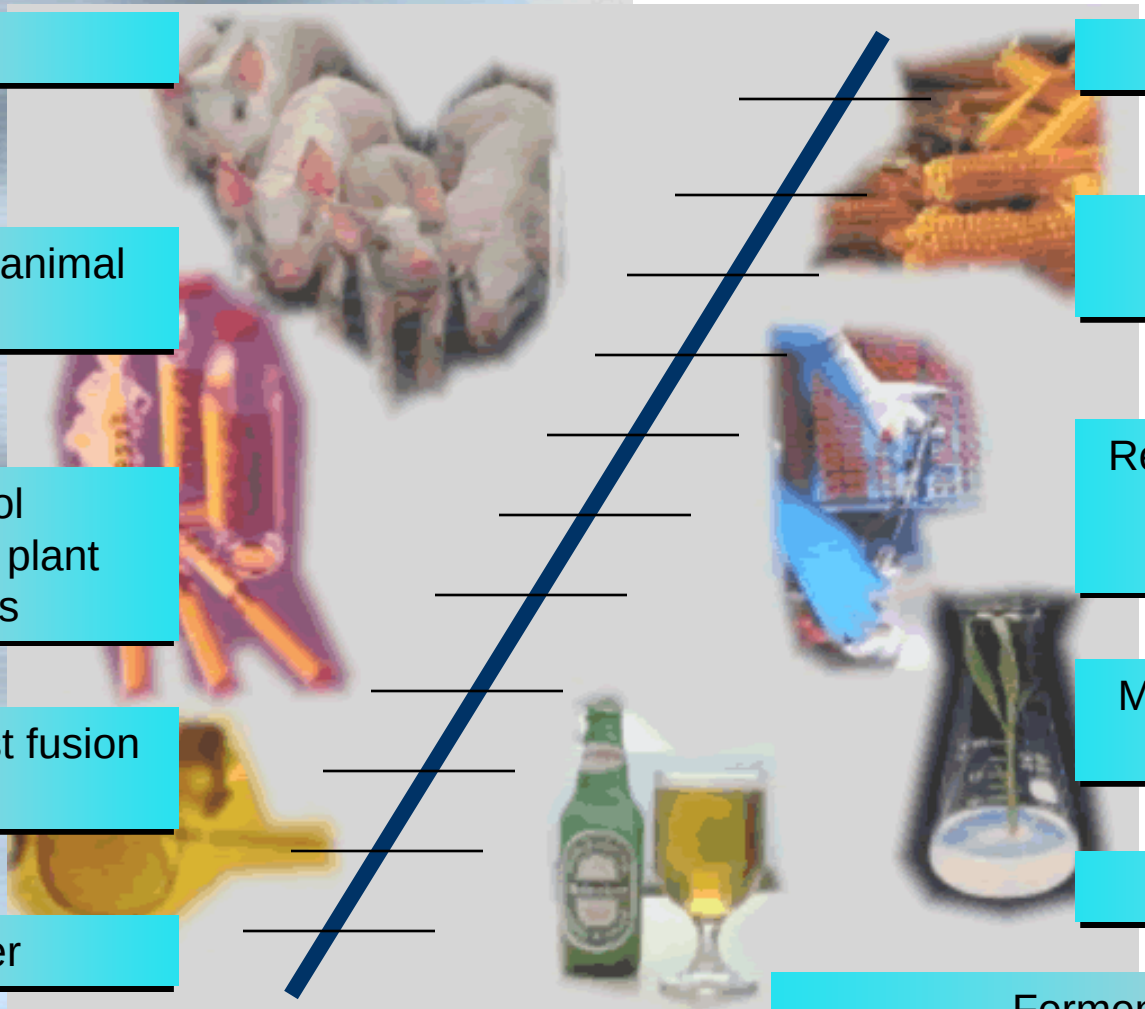
GE of animals

GE to develop animal vaccines

GE of biocontrol agents against plant pest & diseases

Plant protoplast fusion

Embryo transfer



GE of plants

GE to improve microorganisms

Recombinant DNA for disease diagnostics

Monoclonal anti body production

Plant tissue culture

Fermentation, Biofertilizers




American Poultry Association (APA) lists nearly 400 breeds of chickens most with several varieties

The APA *Standard of Perfection* sets the ideal qualities for each breed and variety

Poultry Breeds

BAG. 1: POULTRY PRODUCTION

Genetic progress

- Modern broiler grow three times faster than 30 years ago and require less than half the feed.
- Egg numbers increased from less than 270 to 340 between 1950 and 1993. Feed efficiency improved by 32.4%
- But: incidence of skeletal problems has increased, as well as mortality due to stress (altitude, humidity, temperatures, etc.)

Industry Structure

Today, 74% of the world's poultry production is controlled by the "industry".

- Primary breeders
- Multipliers (cross the parents and send eggs to hatcheries)
- Hatcheries (supply one-day old chicken to egg and broiler producers)
- Producers (eggs or

Primary Breeders

- Primary Breeders - engineer development of the first three generations of birds which commercial growers ultimately market as fifth generation.
- They keep four inbred pure lines.
- They send the "parent animals" to multipliers, providing only male chicken of the male line and female chicken of the female to exclude possibility of breeding by the multipliers ("biological lock").
- **Millions of day-old chicks are shipped around the globe.**

Industrial Poultry Breeding

- There are separate breeding operations for broiler and layer hens.
  - Broilers: only male chicks raised (?)
  - Layers: Only female chicks raised.
  - Chicks of the unwanted sex are immediately destroyed after hatching.
  - Hybrid chicken are trade secrets.
  - Chicken rearers can not breed them, but continuously have to purchase new batches.

Role of Genetic Engineering

- Since 1980s, genetic engineering of chicken has been feasible
- Production of transgenic birds common in laboratory chicken
- Public backlash feared in chicken used for food production
- Industry geneticists regard genetic engineering for disease resistance as desirable
- Since primary breeding is veiled by secrecy, who knows if g.e. is not practiced?

White Leghorn:

- Standard Weights: **Cock**-6 pounds; **Hen**-4-1/2 pounds; **Cockerel** -5 pounds; **Pullet**-4 pounds.
- Skin Color: Yellow.
- Egg Shell Color: White.
- Use: An egg-type chicken
- Origin: Leghorn, Italy

Road Island Red:

- Standard Weights: Cock-8-1/2 pounds; Hen-6-1/2 pounds; Cockerel-7-1/2 pounds; Pullet-5-1/2 pounds.
- Skin Color: Yellow.
- Egg Shell Color: Brown
- Use: Dual purpose
  - used more for egg production
- Origin: New England states of Massachusetts and Rhode Island,

Contoh Kasus : Facts of Poultry Production in China

- **Largest poultry population in the world: 15.198 billion birds in stock plus slaughtered in 2005**
- **Top egg producer in the world, 28.795 million tons in 2005, representing 40% of world total production**
- **Second largest poultry meat producer in the world**
- **A kingdom of waterfowl, with over 70% ducks and 85% geese in the world**

Before 1980, the poultry production in China were mainly in the form of backyard farming, with vast diversity of native breeds and low production efficiency

Reproduction and Breeding

- Cockerels and pullets can become sexually mature by 14 to 16 weeks of age
  - Good fertility occurs at least 2-3 weeks after the onset of egg production
- Industry delays sexual maturation to 18 to 25 weeks
  - Allows birds to develop body conformation which results in better egg size
- Reproduction occurs with light stimulation after they attain an appropriate body weight and conformation
- As little as 14 hours of light can stimulate reproduction (15-16 hours best)
  - Light stimulation can be ‘staggered in’
  - Light duration must be consistent from day to day

Broiler chicken production

Integrated Industry – Production Complex
30-40 mile radius

Hatchery, Feed mill, Growing houses, processing plant

Hatchery – Broiler Breeders
~1000 chickens
Ratio of female:male is 12:1

Lifespan – 45 wk

Eggs to hatchery

Broiler production

Broilers ready for market at 6 weeks of age
~ 4-5 lbs (males weigh more)

Grower provides space
Chicken houses – 60,000 birds, automated, $300,000

Company provides - feed, heat, medicine, chicks

Input - corn

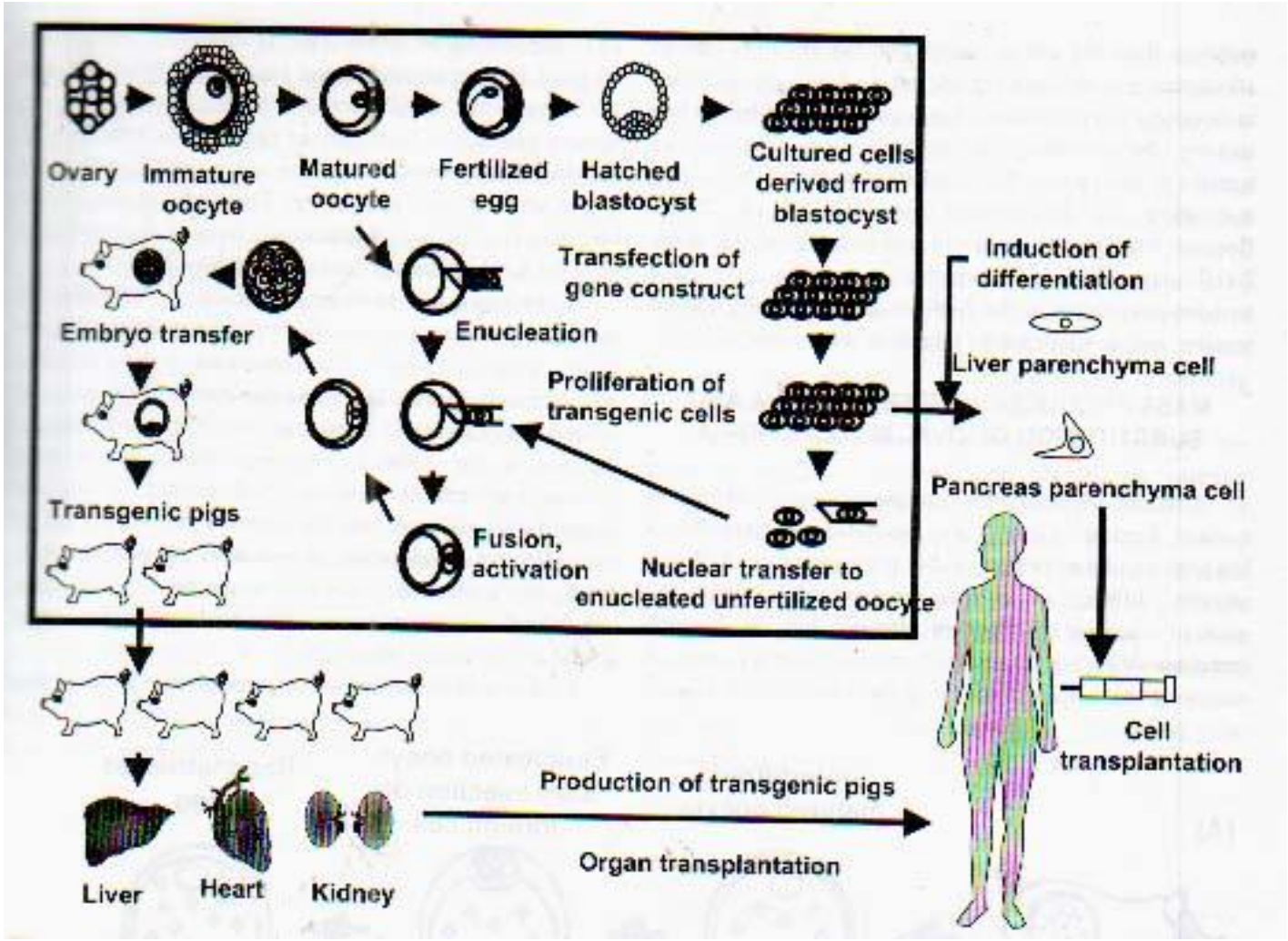
Tyson kills 42 million chickens a week


Megan Rieley looks over the current flock of 90,000—about two days away from market—that stretches as far as the eye can see in the family's three chicken houses.

In Dev. Country:

Vietnam: Taking 20–25% of total agricultural production, livestock enterprises are very small and comprise pigs, ducks

BAG 2: NON Conventional Product of Livestock: transgenic animal (BABI)



The Basics: Bagian II: PIG

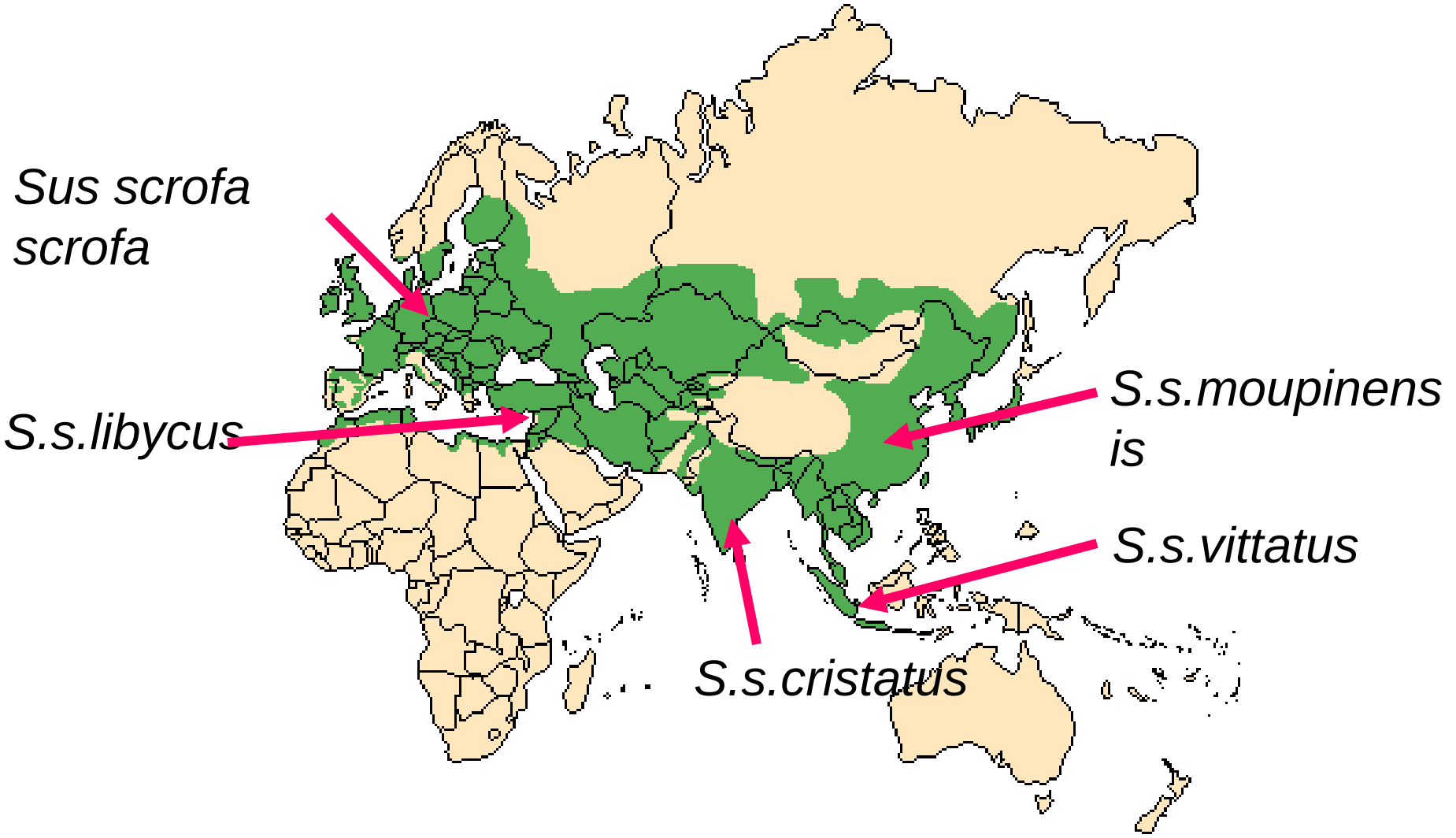
- Scientific Name
  - *Sus domesticus*
  - Porcine
- Classifications
  - Boar
  - Sow
  - Gilt
  - Barrow

Type of pig	2n
S.s.scrofa (W&C Europe) *S.s.nigripes* (Kyrgyzstan)	36
All other wild *S.scrofa*, as far as known Most domestic pigs, as far as known	38
3 domestic breeds: Yorkshire, Old Swedish, Ryukyu	40

Swine – high reproduction rate, rapid genetic selection

Sus scrofa

ancestor of most domestic pigs

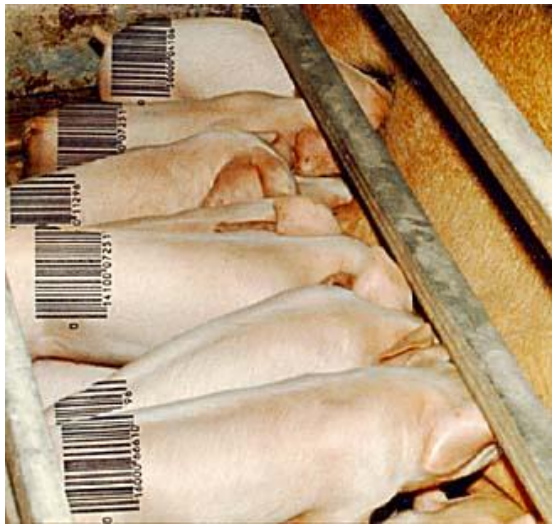


The other domesticated pig: *Sus celebensis*

Distribution: Sulawesi, Halmahera, Flores, Timor. No other terrestrial mammals are shared between even two of these islands

Improvement of animal traits

- Growth rate
- Meat quality
- Disease resistance
- Reproductive performance
- Behavior

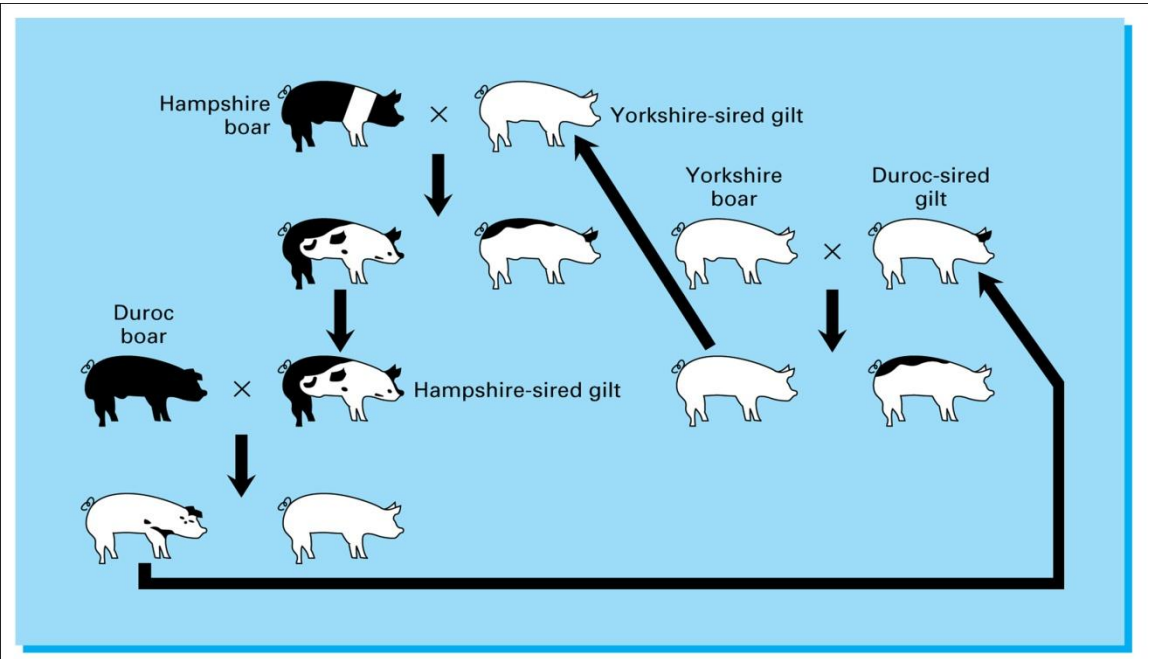


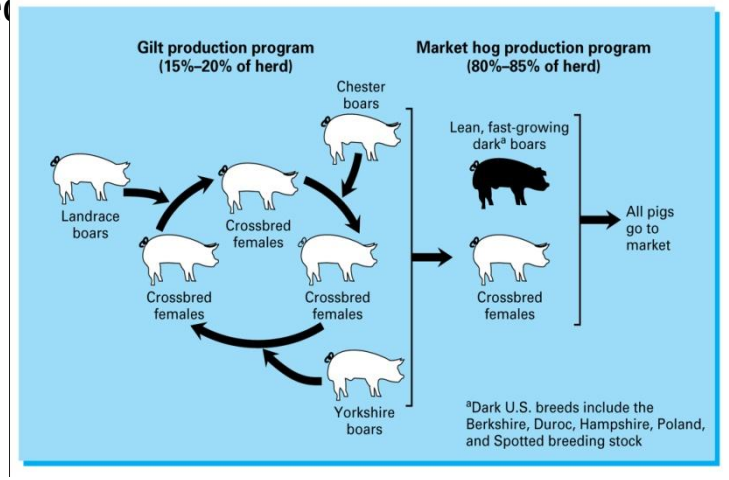
Example of animal breeding

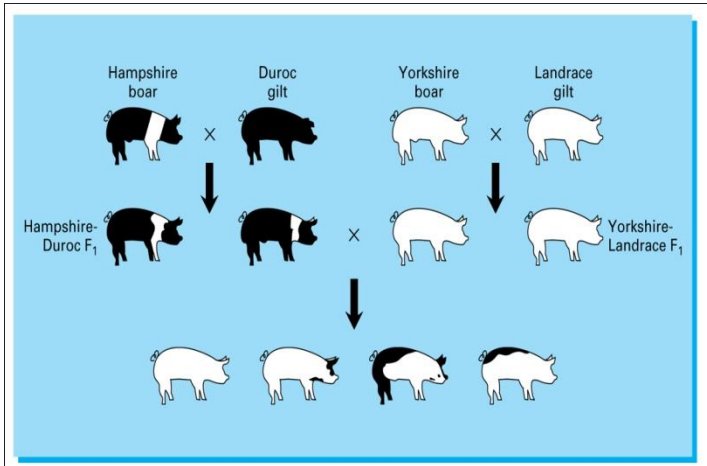
- Meat quality in pigs
  - Meat-to-fat ratio
- Cross Chinese Meishan pigs with European Large White pigs
- Meishan much fatter than European variety
- Identified QTL for lean meat

Crossbreeding: Commercial Swine Production

- Rotational Cross
  - Two + Breeds
  - Different breed boar is crossed with crossbred offspring of previous generation
- Terminal Cross
  - Crossbred females are mated to a boar of a third breed
- Rota-terminal
  - Combination of both systems
  - All pigs go to market
  - Female traits are not selected for







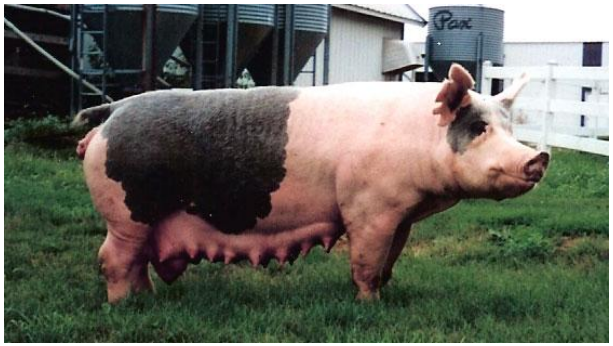
Two different breed-groups of pig

European:
Generally small, dark, long-legged, prick-eared, long-faced. Herded.
Now most breeds are rare.

Chinese:
Generally large, pale, short-legged, floppy-eared, short-faced.
Kept in sties.
Imported into Europe in late 18th century, caused a sensation; most modern pig breeds are either Chinese or crosses.

Genomics of farm animals

- Livestock farming = 30–40% of world agriculture
- farm animals provide much of the protein in the daily diet in developed world
- Disadvantages of genomics
  - Large sizes of farm-animal genomes like humans
  - Long gestation times
  - Difficulty of doing genetics
- Nevertheless, genomics programs have been initiated for most of the major farm-animal groups, including pigs, cows, sheep, and poultry.
  - Genes can be manipulated, either through breeding or through genetic engineering, to remove deleterious traits and enhance desirable traits



Problems and Prospects of pig production (Dev . Country)

- ✓ Production or management problems: low average productivity

The problems of mgt are linked with those of production and these includes:

a. nutrition b. labourc. capital d. Disease control e. breeding and f. marking

- Low literacy level
- Rejection of technical assistance
- Housing condition- moist, no waste disposal, inadequate ventilation and drainage, under-utilization of space, overcrowding, foreign designs.
- No attention to breeding programme

- ✓ Record keeping- scanty records, very few farms have record on input, such as (i) feed, (ii) drugs or (iii) accurate record of stock that is slaughtered or sold.
  - No critical analysis of the economic performance of the operation
- ✓ Problems of feeding :
  - most problematic
  - Genetic potential must be express through adequate nutrition
  - Inadequacy in quality and quantity of feed
  - <5% of feed is for Pig production, adaptation of poultry feed for pigs
  - Inadequate provision of water. Volume given determines feed efficieny.

- ✓ Health Problems:
  - Good knowledge of routine helath and prevention produres
  - Difficulties of employing the assistance of veterinary doctors
- ✓ Housing problems-
  - Inadequate knowledge of the floor space requirement of pigs
  - Under-utilization of space and overcrowding
  - $2.23m^2$ is required
    - 2-3 pregnant sows
    - 5-6 becon pigs up to 90kg body weight
    - 10-12 weaners
- ✓ Marketing Problems:
  - Pork is acceptable by some people and religion
  - Fresh pork, Sausage, Becon and Ham- products
  - Dispose off pig at 70-90kg body weight if not use for breeding