



# 优化母猪繁殖性能

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成都



恩睿康

Enable



# Preparation of the Female

## 为雌猪做准备工作

Gilts should be selected from productive females.

后备母猪应从高产量的雌猪中选择。

White breeds (Landrace, Large White, Chester White, Welsh) have higher productivity. Colored breeds may add durability and disease resistance.

白品种（长白，大白，切斯特白，威尔士）有较高的产量。有色品种可增强耐力和抗病能力。

Breeding program should be designed to maximize heterosis.

育种计划应为最大化杂种优势而设计。

# Effect of Weight at First Breeding on Pigs Born in Parities 1-5

## 第一次配种体重对 1-5 胎次的新生猪的影响



Body weight at mating	Pigs born in parity 1	Total pigs parities
115 kg (255 lbs)	7.1	51.0
125 kg (275 lbs)	9.8	59.2
135 kg (300 lbs)	10.3	60.4
145 kg (320 lbs)	10.5	63.1
155 kg (340 lbs)	10.5	54.2

# Heterosis and Complementarity

- Complementarity 补偿优势
  - Take advantage of differences between lines.  
品系间的优势互补
- Heterosis 杂种优势
  - recovery from inbreeding depression  
克服近交劣势

**Table 5. Relative performance of breeds.**

<b>Breed</b>	<b>Concep- tion rate</b>	<b>Litter size raised</b>	<b>21-day weight</b>	<b>Age at 220 lb.</b>	<b>Back- fat</b>
Berkshire	+	-	-		
Chester White	+	++	-	--	A
Duroc	A	A	-	+	-
Hampshire	A	-	A	-	++
Landrace	-	++	++	A	-
Poland				A	+
Spotted		--	--	+	-
Yorkshire	-	++	+	+	-

# Maternal Body Type 母本体型



Maternal lines should be rather “Square” in appearance, with a large hip area but not too much “round” muscle. Bulging round muscle is a reflection of small internal bone dimension.

母本体型应该外观方正，后躯发达但没有圆形肌肉，大块圆形肌肉是内部骨架小的反映。

“Square” styled female lines tend to have more pigs at birth, larger pigs at weaning, and fewer difficulties in farrowing.

母本方正体型，产子数更多，断奶体重更大，分娩困难较少

In China there is a tendency to select for muscling not for soundness.

下面的图片中有一些近乎完美的个体，中国的选种倾向于选择肌肉量，而不是结实度

利穆赞



荷斯坦





## ROUND OAK RAG APPLE ELEVATION

### Holstein Bull of the Century

On August 30, 1965 Elevation was born near here on  
Round Oak Farm, owned by Ronald A. Hope & Sons

Through the use of frozen semen and artificial insemination, Elevation  
gained international acclaim. In 1999 the Holstein International  
Publication named him its "Bull of the Century". Elevation sired a rare  
combination of superior production, conformation and longevity. He is  
credited with more than 100,000 recorded offspring and has over 8.8  
million descendants. Upon his death in 1979 he was buried on the  
lawn at Select Sires, Inc., Plain City, Ohio.

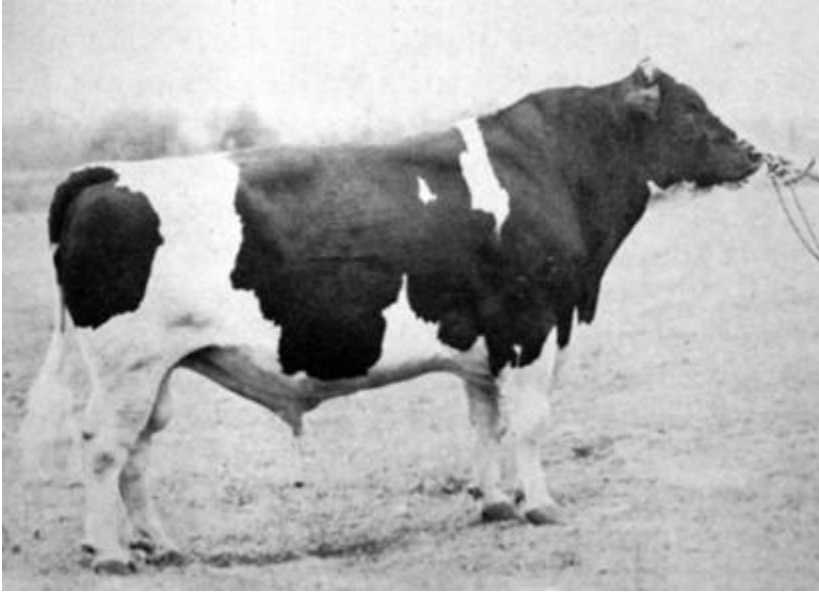
In agricultural history, no other animal equals  
Elevation's impact on the world.

Virginia Holstein Association  
2006

# Round Oak Rag Apple Elevation



*“His daughtters  
had greatt legs  
and feett.”*

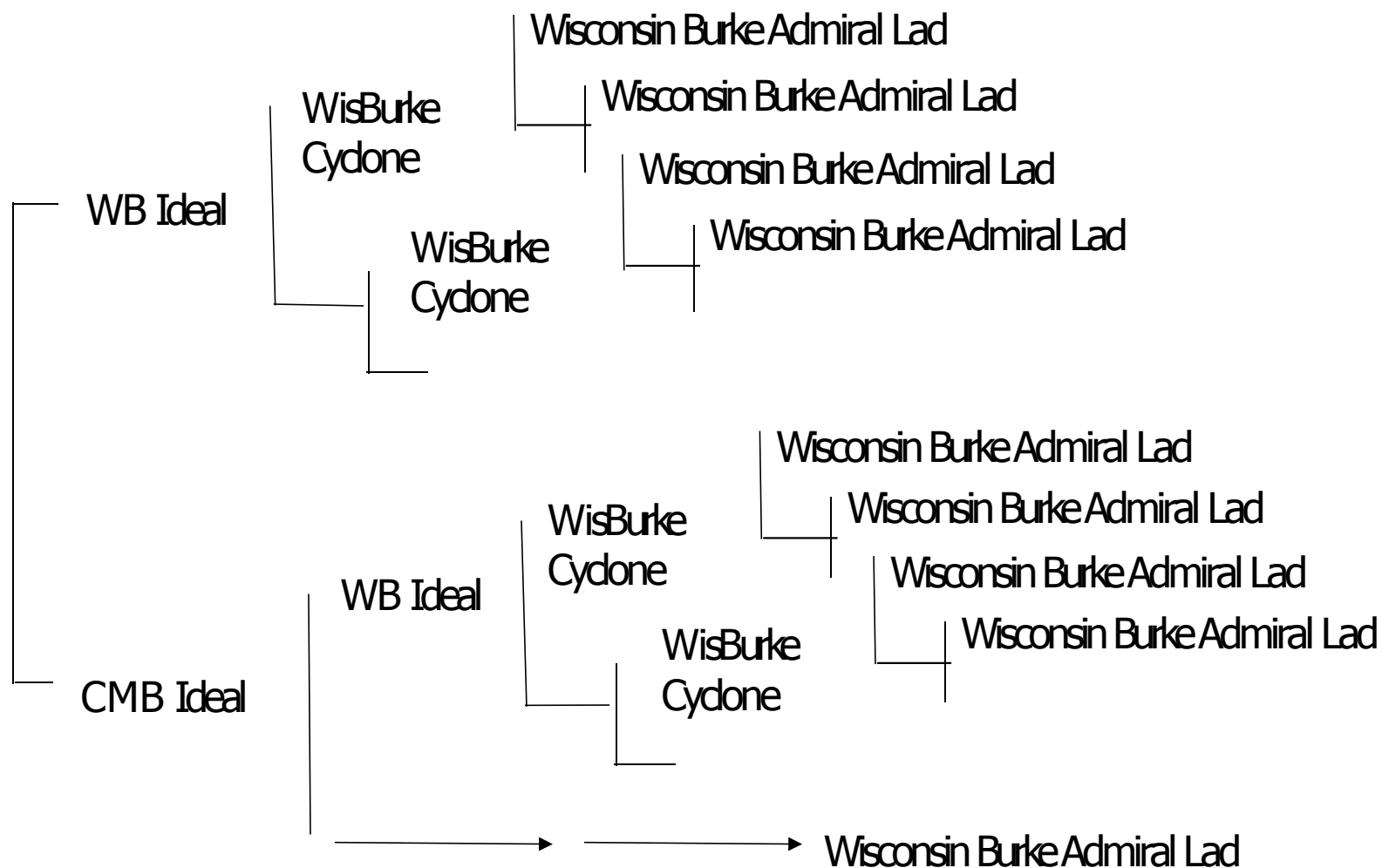


Tidy Burke Elevation  
(inbred)

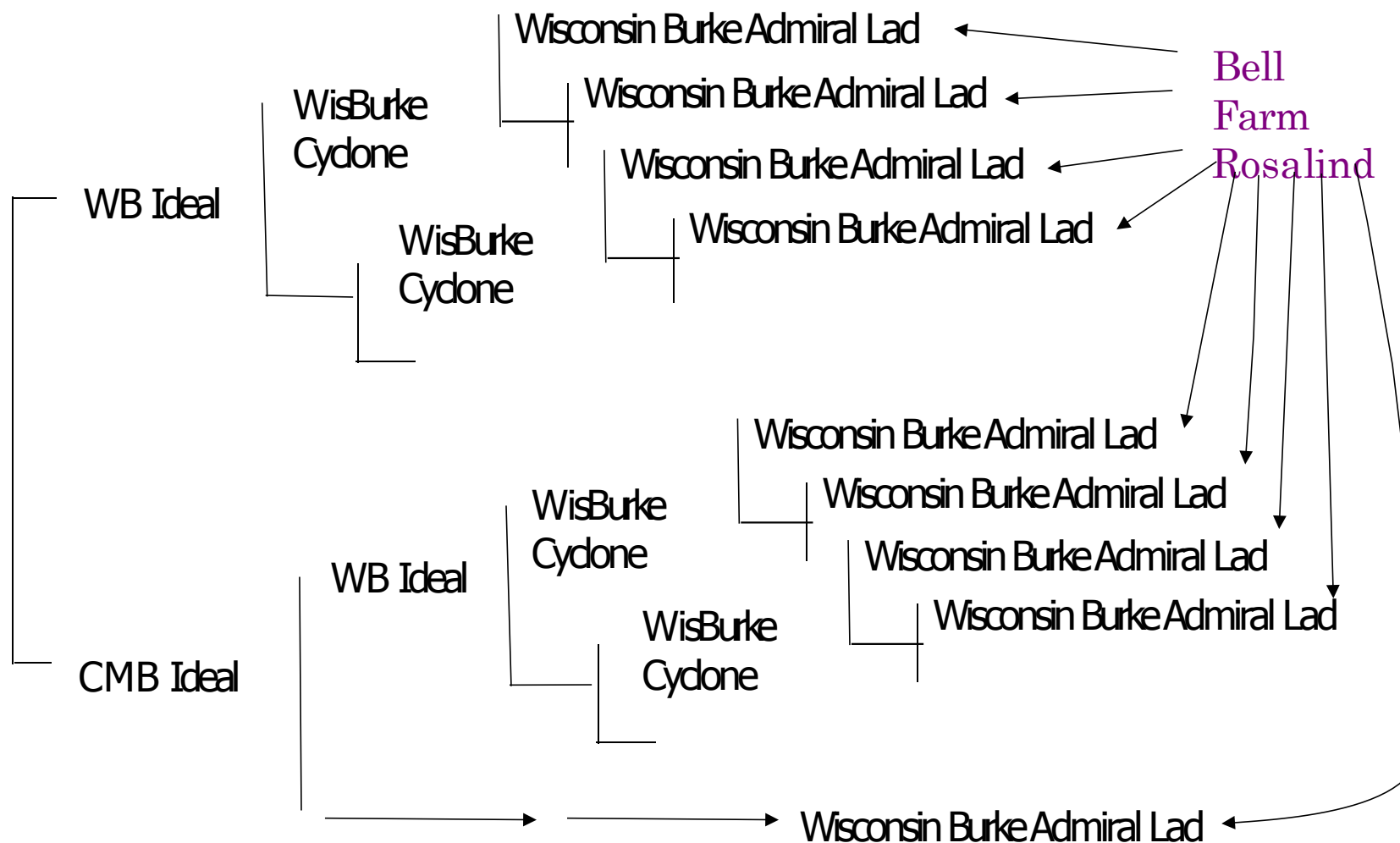


Round Oak Rag Apple  
Elevation  
(outcross son)

# Tidy Burke Elevation



# Tidy Burke Elevation





Senior Gel sired by Tidy Burke Elevation

# NH79

Gold Medal Sire

Born: 3-23-55  
Weight: 1850 lbs.

**NH79 TIDY BURKE ELEVATION—1271810**

Bred by: E. A. Dawdy, Salina, Kansas  
Purchased from: E. A. Dawdy and Glenn Palmer, Topeka, Kansas

## PRODUCTION

29 HIR Daus. Avg.  
16,325M 3.54% 578F  
28 DHIA Daus. with Herdmates Avg.  
15,512M 3.6% 554F  
+1,664M +51F

## TYPE

23 Class. Daus. Avg. 85.8 points  
3 Ex, 12 VG, 8 GP

## BREEDING

"Elevation" is a closely bred Burke bull, being sired by Wis Burke Ideal, and out of a "Wis Burke" daughter. "Wis Burke," undoubtedly one of the great sires of the breed, has held up well under fire as proved by the high production and outstanding classification of his many daughters. (Please note classification and production information in the pedigree.)

"Elevation" was purposely brought into the Noba stud to duplicate his sire's accomplishments. To date, the indications are that he will do so.

## BREEDER ACCEPTANCE

The "Elevation" artificially sired daughters are just starting to calve throughout Nobaland. His popularity will undoubtedly increase as more breeders realize the potential of this sire. His use has been somewhat limited due to an injury as a calf that has left him in a near crippled condition. Except for the fact that Glenn Palmer had great faith in the way he was bred, he probably would have been doomed to oblivion.

Twenty-one daughters in the Palmer herd averaged over 86 points on classification. This average included 3 Excellents, 11 Very Goods, and 7 Good Plus. The "Elevations" are the major contribution to the high scoring and producing herd that Mr. Palmer has developed.

## USE PATTERN

"Elevation" shows an increase in every classification breakdown over both his dams and breed age average. His daughters type score, with 15 of his 23 classified daughters scoring Very Good or better, seems almost fantastic considering that the daughters have not been culled out or selected.

"Elevation" should work best on large, stretchy, open or rough cows. Classification and personal observation indicate that he does have the ability to improve body depth, length of rib, and strength through the heart and chest. Mammary systems are tightly attached with improvement on both fore and rear udders.

The daughters at Palmers are smooth, well balanced, and show a great deal of uniformity, following somewhat the pattern of the Wis Burke Ideal daughters.

## Sire:

**WIS BURKE IDEAL—1013415**

"Very Good"—Gold Medal  
736 HIR Daus. Avg. 14,696M 3.6% 530F  
1295 DHIA Daus. in March 1964 USDA  
Report Avg. 13,676M 3.6% 487F  
Increase of 373 lbs. Milk over herdmates  
813 Classified Daus. Avg. 82.6—An increase of 1.35 over expectancy

## Dam:

**CARINE MERCEDES BURKE IDEAL—3348181**

Classified "Excellent"  
3-0 353 das. 18,561M 3.5% 648F 2x  
4-6 365 das. 21,620M 3.7% 806F 2x  
6-6 365 das. 21,459M 3.9% 827F 2x

**WIS IDEAL—933122**

"Ex"—Gold Medal Sire  
61 Daus. Avg. 13,885M 3.6% 506F  
58 Prs. Daus. 13,795M 3.6% 503F  
Dams 13,025M 3.6% 477F  
62 Classified Daus. Avg. 83.5  
8 "Ex," 16 "VG," 26 "GP" and 12 "G"

**WIS JUANITA—2454577**

2-1 365 das. 13,718M 3.4% 499F 3x  
4-6 365 das. 19,824M 3.4% 668F 4x  
7-0 155 das. 10,547M 3.9% 410F 3x  
(Incomplete—Died during this lactation)

**WIS BURKE IDEAL—1013415**

"Very Good"—Gold Medal Sire  
(See Above)

**RAVEN BURKE CARINE MERCEDES—2948518**

Classified "Good Plus"  
2-6 283 das. 12,903M 3.6% 459F 2x  
3-6 359 das. 17,238M 3.7% 646F 3x

## Elevation Daughters



Elevation Lochinvar Burke  
Excellent at 3 years  
3 yrs. 2x 365 16,123M 3.5% 558F



Elevation Burke Edna "VG-88"  
All Kansas 4-yr.-old  
5 yrs. 2x 288 19,520M 3.7% 718F Inc.



Perfection DeKol Burke  
Excellent—91 points  
3 yrs. 2x 365 18,806M 3.7% 693F

# Large White



- Dam has 6 parity average of 14 born alive, 10.3 weaned at 168 pound in 141 day farrowing interval
- King David line known for sow productivity
- Use to add growth rate, body width and thickness

King David 182-8

Sire: King David 347-9

Dam's Sire: Frontier 208-14

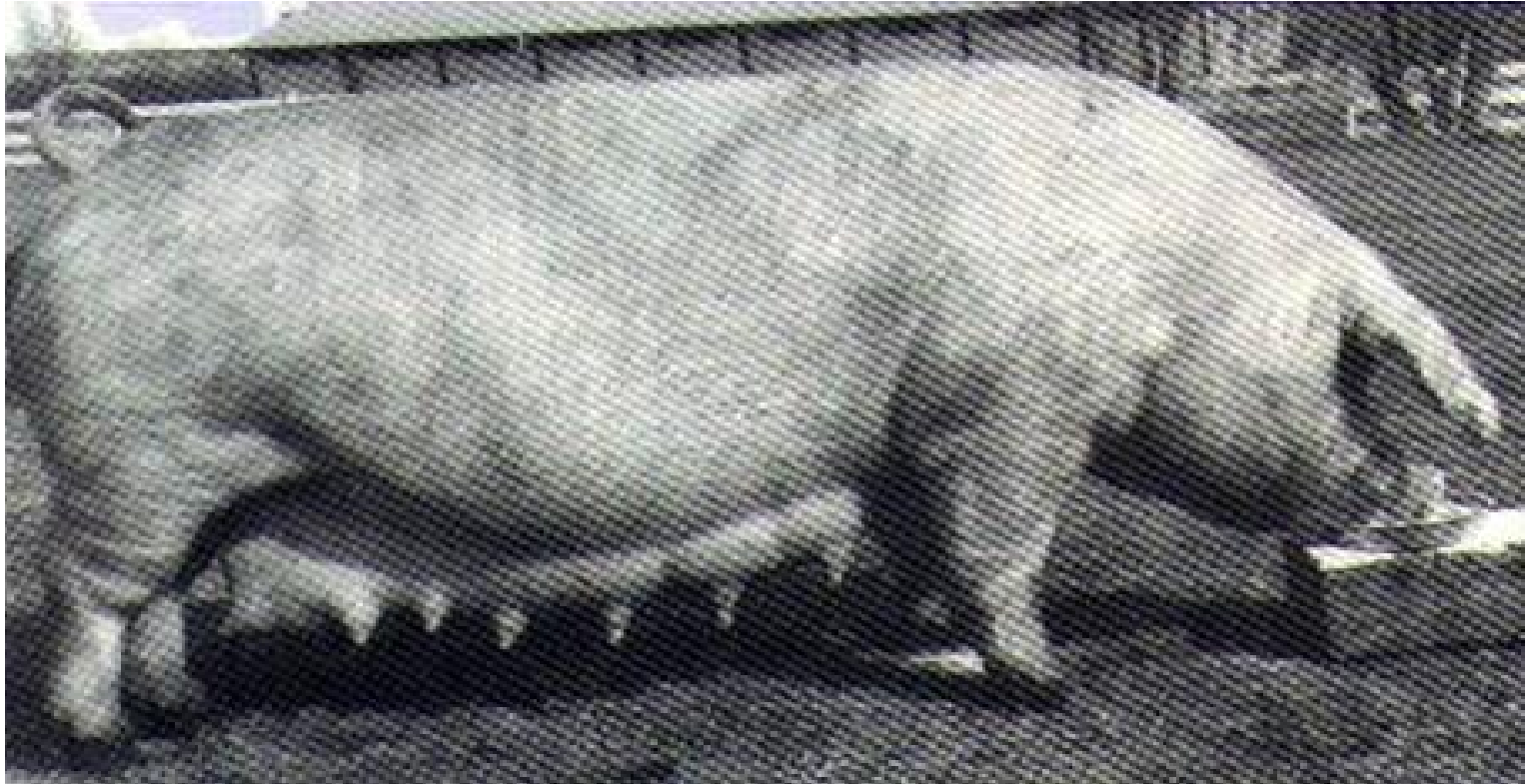
EPD/Index	%/Rank
.59 NBA	5%
6.62 LW	5%
-1.62 Days to 250	
.05 BF @ 250	
117.1 SPI	5%
116.75 MLI	25%

131 Days to 250 .58 BF @ 250 6.29 LEA @ 250

# Landrace



# Chester White





- Chester Whites , Pennsylvania , 1940.

- Duroc
- 杜洛克

• X

• 商品代

• 大白

• X

• 长白

• 大长二元 母猪  
• ( F1 )

# Duroc



# Hampshire



# Pietrain









Figure 5. A pig with a common defect—small inside toes.



Figure 7. Cracks and ulcers on the bearing surface of the foot.

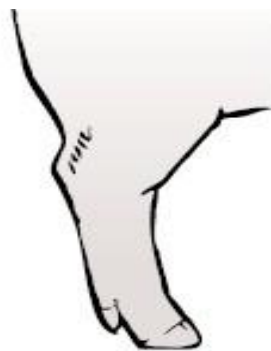


**Even front toes with slight spread, good slope and cushion to the pastern allows the foot to set squarely on the floor surface.**



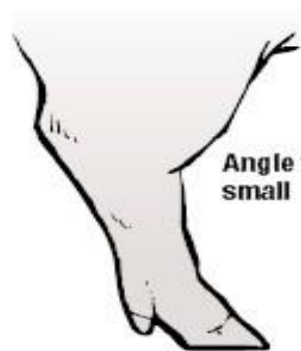
**Even rear toes with slight spread, good shape and cushion to the pastern allows the foot to set squarely on the floor surface.**

## Side view of rear leg



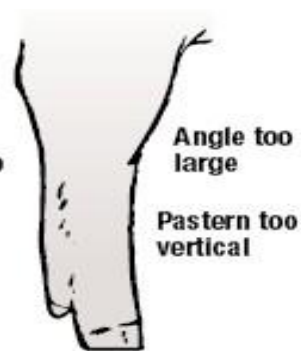
Normal

• ok



Sickle-hocked

• X



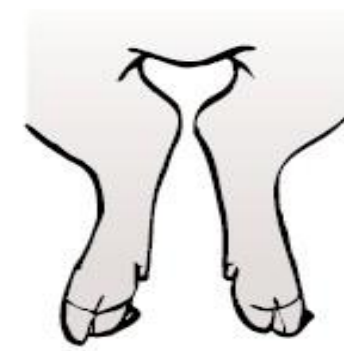
Post-legged

• X



Weak pastern

• ok



Cow-hocked

• X



Weak rear pasterns are considered undesirable. In severe cases, damage to hocks and dew claws can result.



When the angle of the hip, stifle and hock is too large, the animal is described as "post-legged."

## Side view of front leg



Normal

• ok



Weak pastern

• ok



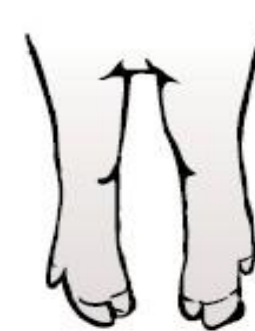
Buck-kneed

• X



Splay-footed  
(toes pointed out)

• X



Pigeon-toed  
(toes pointed in)

• X



This side view shows normal (good) front leg structure. Note how the front legs slope from the shoulder.



This is an example of soft (weak) front pasterns. Note the full dew claw touching the floor.



Straight front legs often cause knee joints to buckle, often called "buck-kneed."

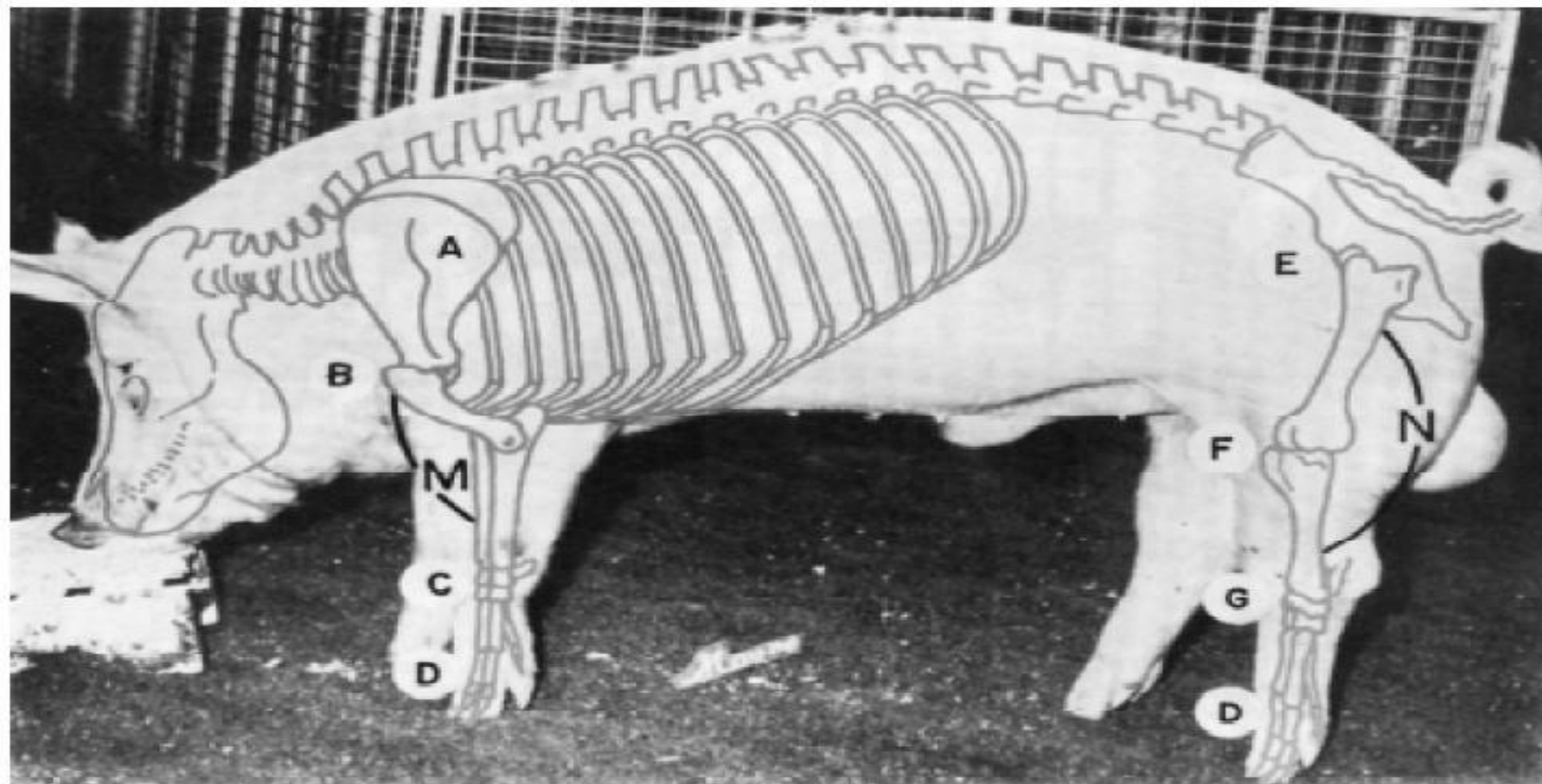


Figure 1. Undesirable front and rear leg structure.

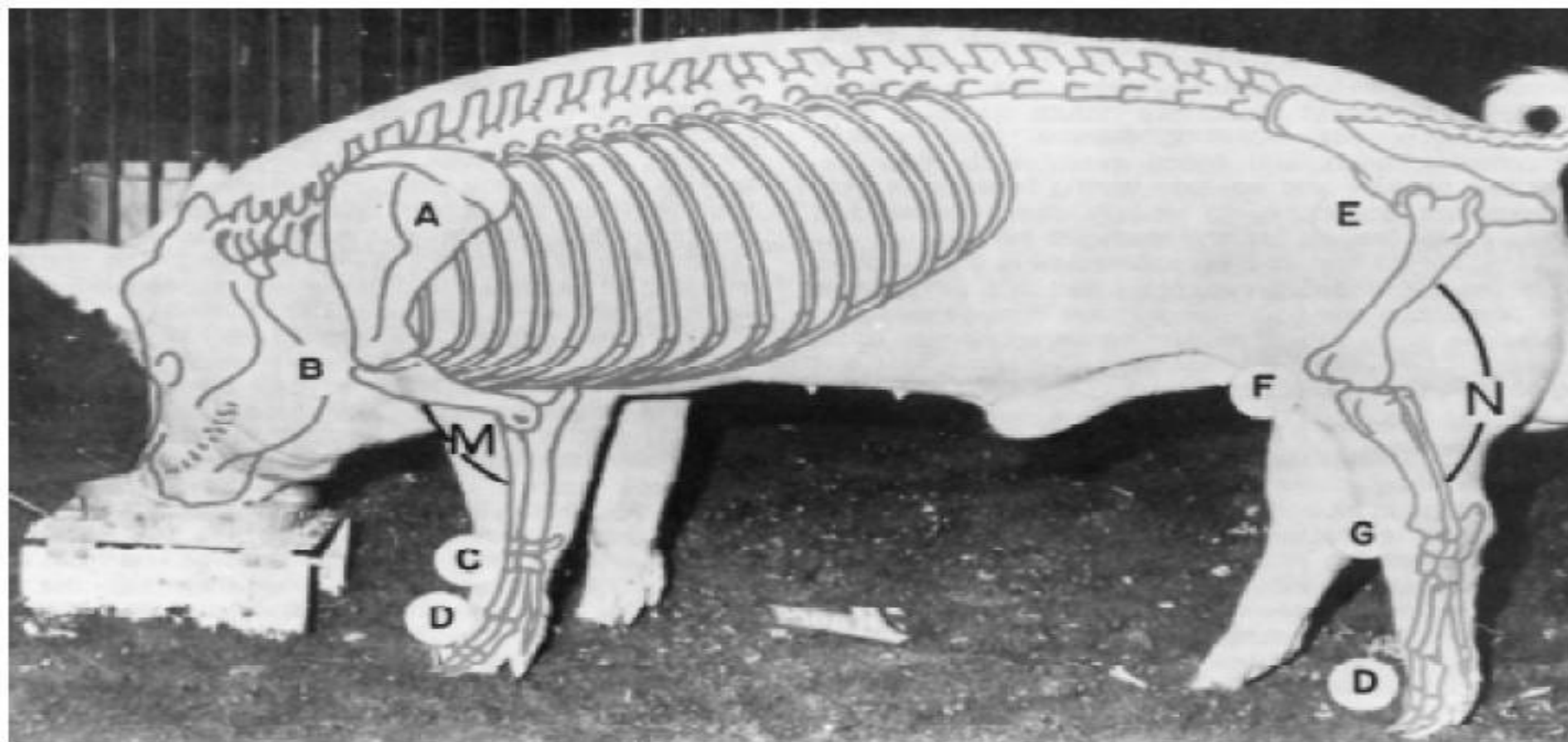


Figure 2. Desirable front and rear leg structure.



- Structural defects are highly heritable and are transmitted
- to the offspring, resulting in sows with unsoundness.
- 结构缺陷高度可遗传，可传给后代，而导致母猪结实度欠佳



- This spraddle-legged sow had a poor foot and leg conformation and is now a serious problem as she cannot get up on her own.
- 这头母猪趾蹄结构不良，出现八字腿，不能站立，成为严重问题

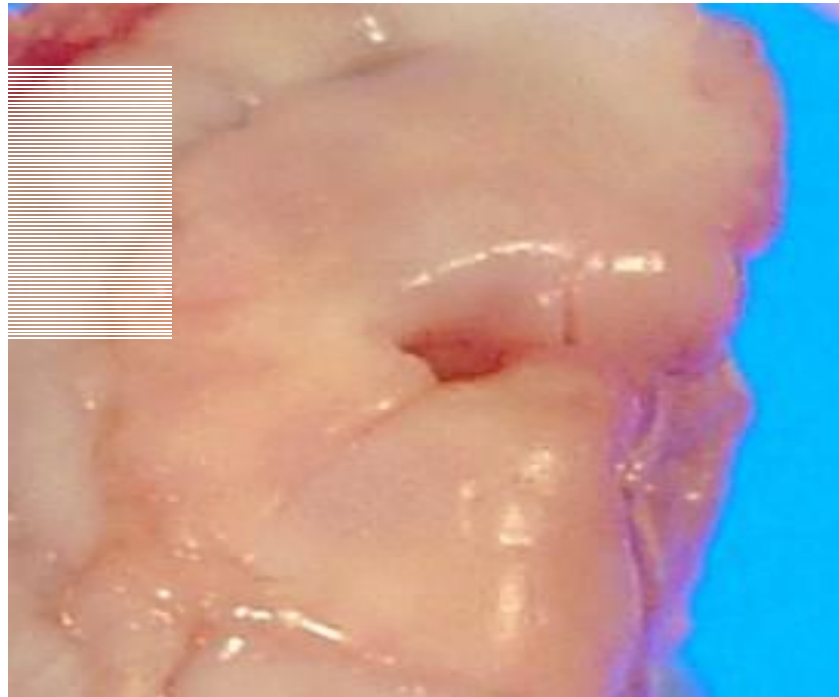
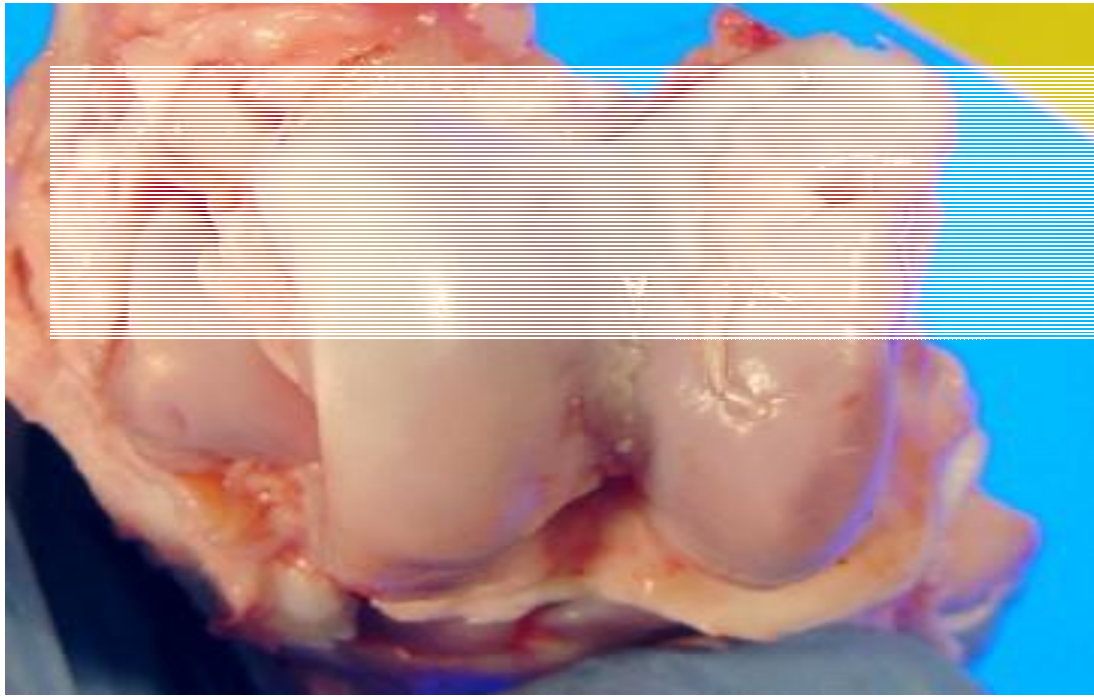


- Severe hock joint capsule swelling due to OCD.

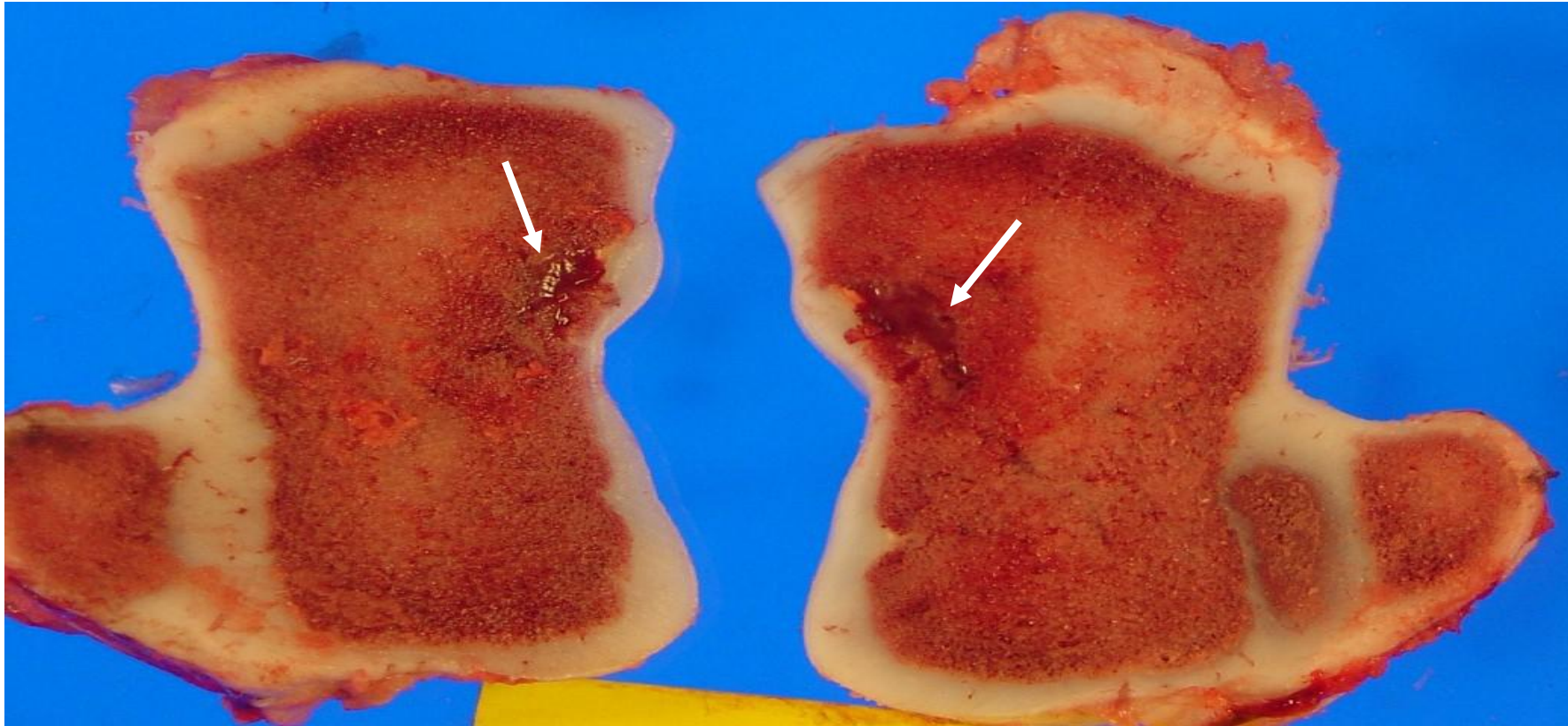


- Close-up view shows
- swelling of hock joint.





- Talar tarsal bone with Grade 5 OCD lesion
- from the pig seen in the previous slide.



- Hemorrhage and Necrosis of Bone underlying failed cartilage.





Dry, flaky, “ichthyosis” (fish-scale) skin lesions. Severe biotin deficiency. Hebei.



Dry, scaly, whitish-gray “ichthyosis” dermatitis due to biotin deficiency and secondary bacterial infection with Streptococci. Liaoning province.



Beginning of recovery after 11 days supplementation with 500 ppb biotin in gestation diet.  
Old dead ichthyotic skin peeling off revealing healthy pink skin beneath.

Yongning, Beijing municipality.



Complete recovery after 30 days supplementation with 500 ppb biotin in gestation diet. Some fly bites are visible on otherwise healthy skin. No visible ichthyosis.

Yongning, Beijing municipality.

# Gilts – No Estrus

## 母猪——不发情



Inadequate Stimulus	刺激不够
Poor Heat Checking	发情检测不过关
Severe Mange	严重疥螨病
Too Low Nutrition Plane	营养水平太低
Seasonal Infertility	季节性不孕
Genetics	遗传基因
Mycotoxins	霉菌毒素



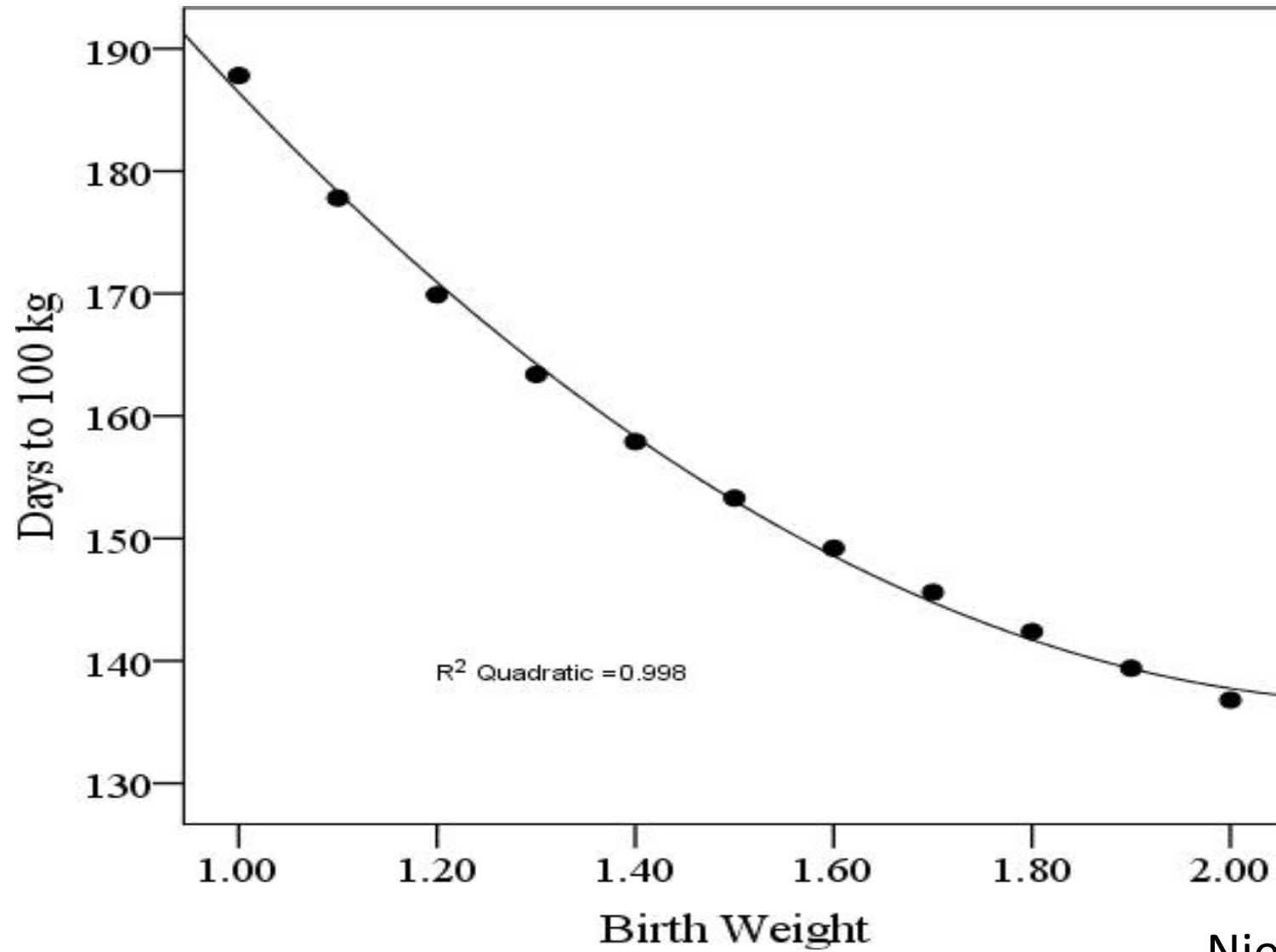
出血性胃溃疡。  
这些溃疡与饲料粉碎太细有关。  
饲料粒度直径应为 600 至 800  
微米才会有最佳饲料效率并可以  
避免溃疡发生。

Bleeding gastric ulcer in pars esophageal.  
These ulcers are associated with feeds too finely ground.  
Feed should be ground at 600 to 800 microns for best  
efficiency and avoidance of ulcers.



母猪和公猪— 750 to 1000 ml 分钟  
怀孕母猪： 8 至 12 升每天  
哺乳母猪： 8 至 25 升多每天

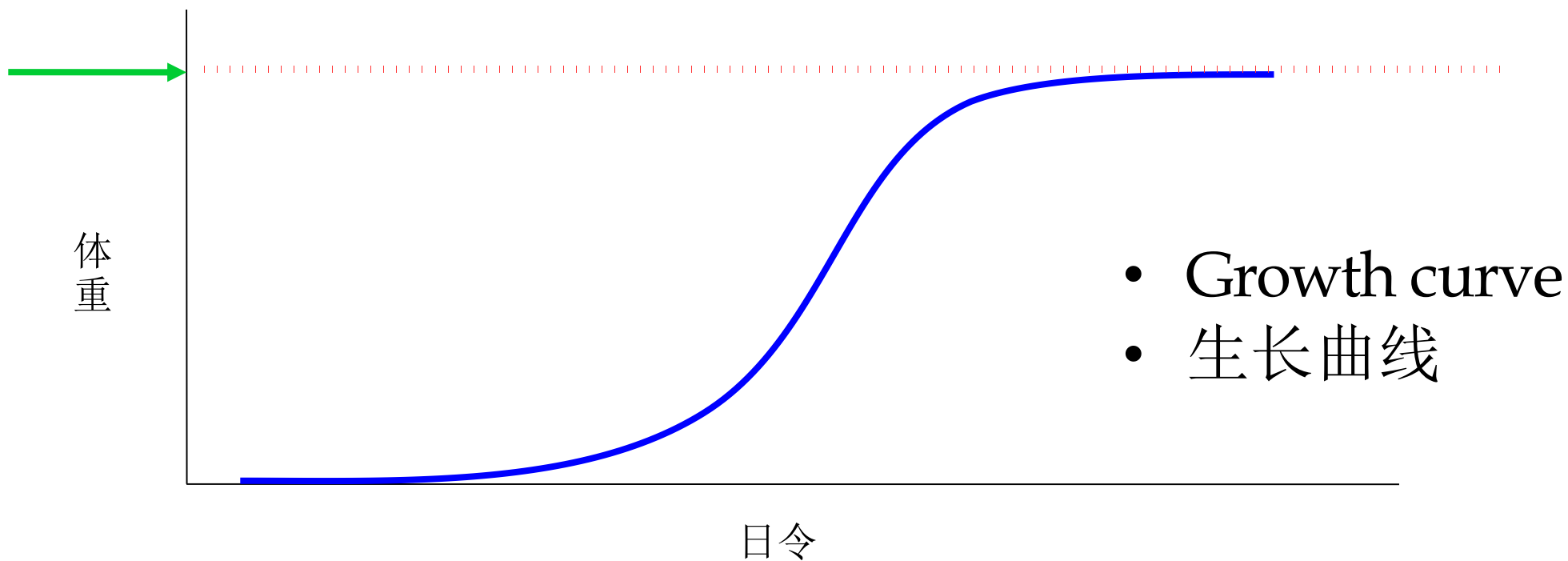
## Effect of birth weight on days to 100 kg



Nielsen, B. et al 2002

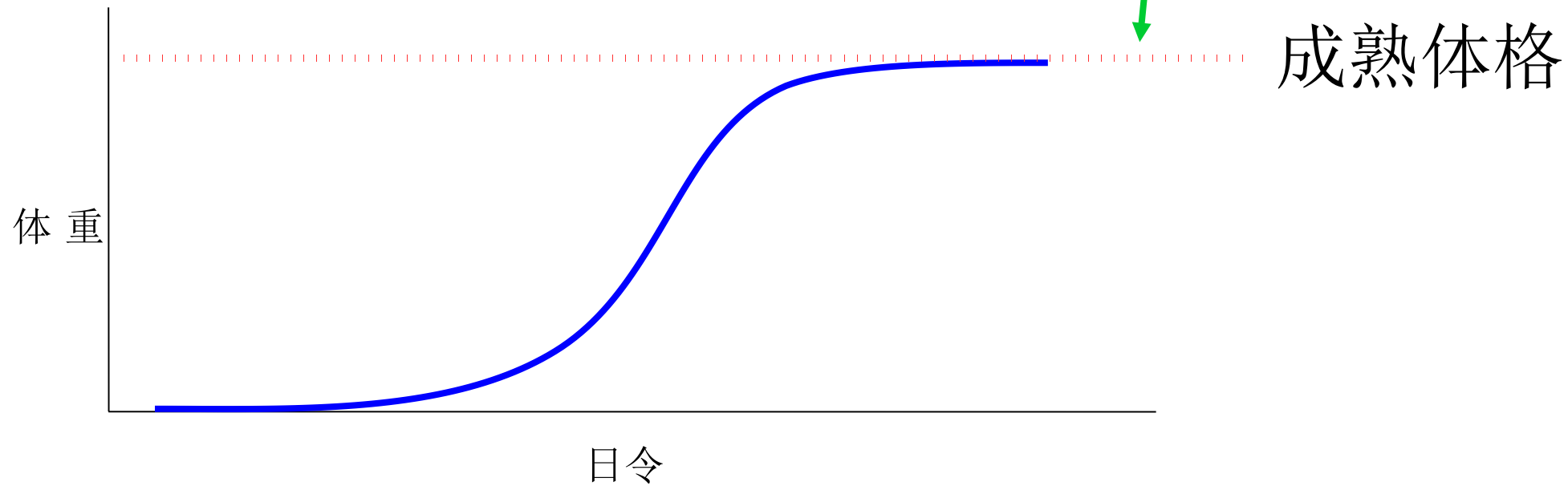
# Mature Body Size 成熟体格

The weight and height and length of the animal when it reaches final maturity.

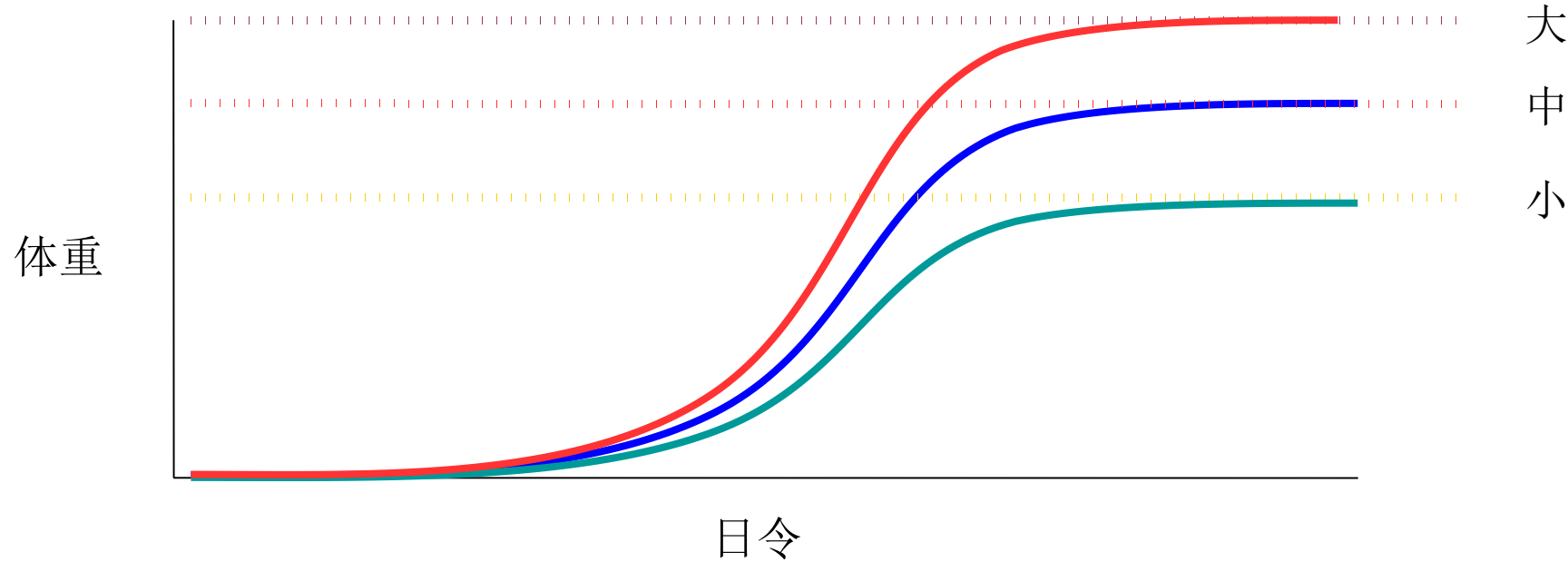


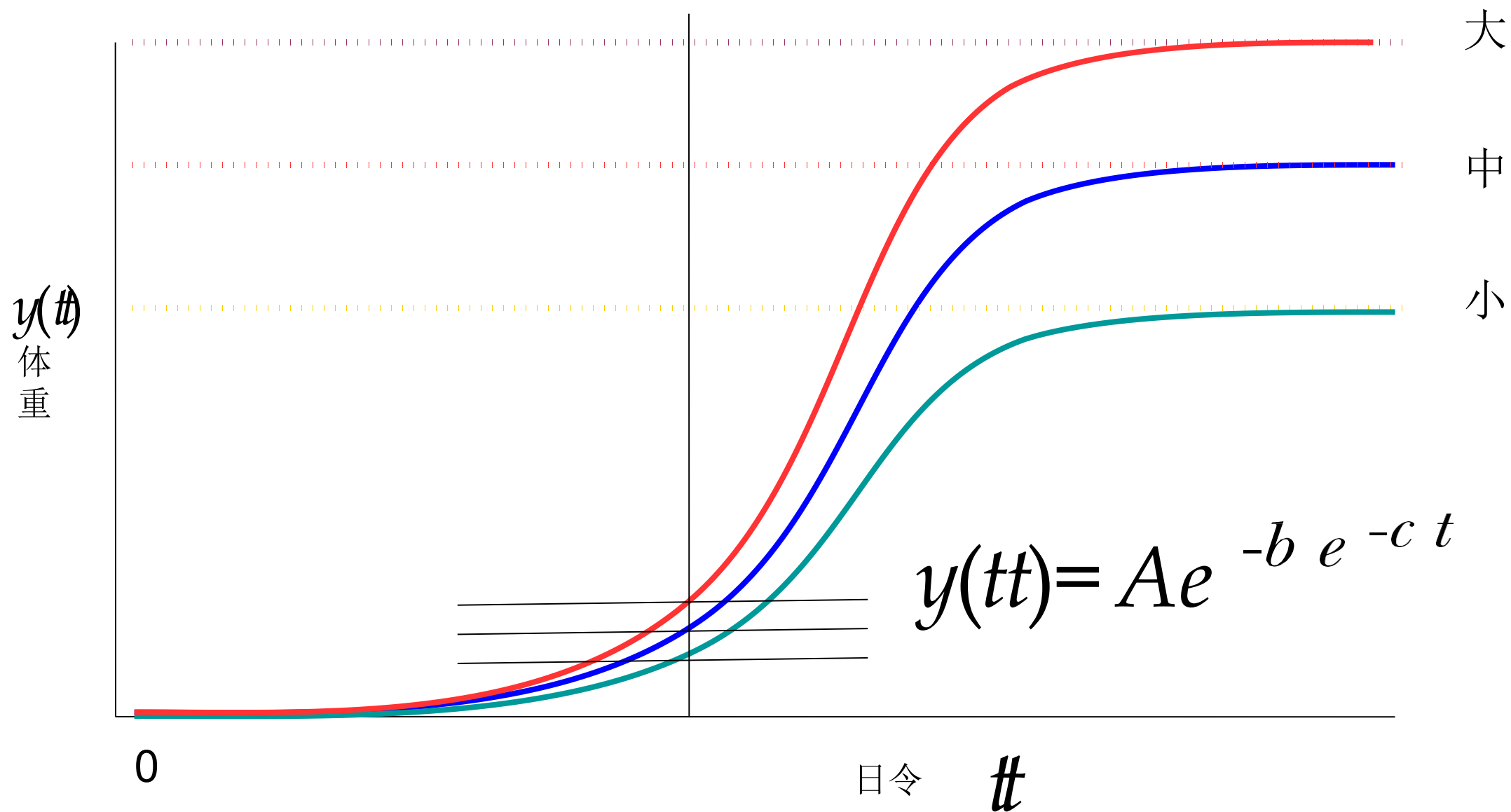
$$y(t) = A e^{-b} e^{-c t}$$

Body weight and growth are a function of Mature Body Size



Mature body size is genetically controlled and differs among individuals and genetic lines.





# Birth Weight is Genetically Controlled

TABLE 3. HERITABILITY ESTIMATES AND APPROXIMATE STANDARD ERRORS

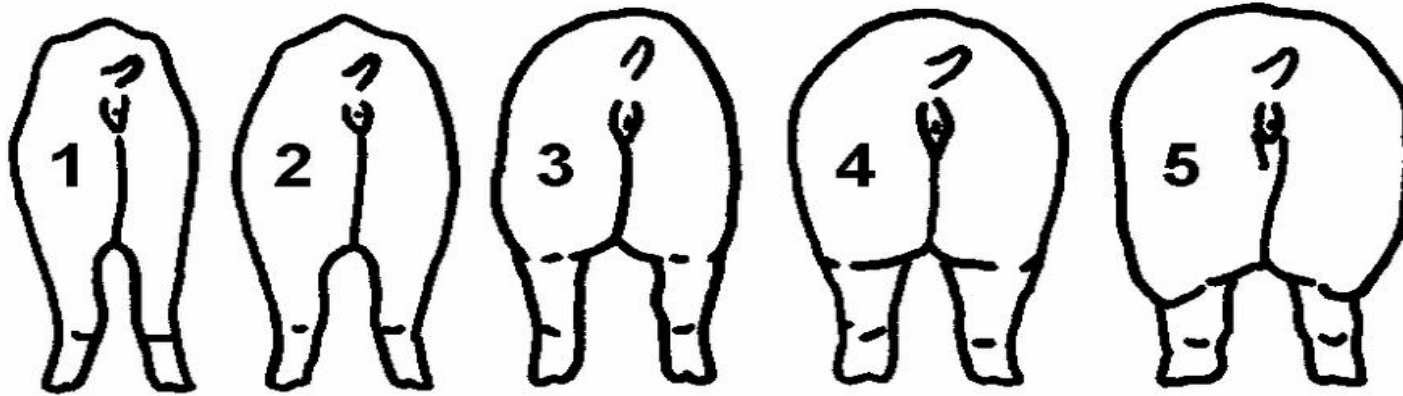
Trait	Heritability	Approximate standard error
Number born	.26	.12
<del>Number born alive</del>	<del>.20</del>	<del>.11</del>
Litter birth weight	.54	.13
Average pig birth weight	.65	.13
Number at first creep	.28	.12
Litter weight at first creep	.17	.11
Average pig weight at first creep	.22	.12
Number at weaning	.30	.12
Litter weaning weight	.15	.11
Average pig weaning weight	-.02	.10
Litter weaning weight adjusted for age and number	-.01	.10



*Irvin and Swiger, J ANIM SCI 1984, 58:1144-1150.*

# Body Condition Scores

- < 15 mm • 15-18 mm • 18-20 mm • 20-23 mm • > 23 mm
- (< 0.6 in) • (0.6-0.7 in) • (0.7-0.8 in) • (0.8-0.9 in) • (> 0.9 in)



Score	Condition	Detection of ribs, back bone, "H" bones, and "pin" bones
1	Emaciated	Obvious
2	Thin	Easily detected with pressure
3	Ideal	Barely felt with firm pressure
4	Fat	None
5	Overly fat	None







Mummies can be caused by several different viral infections

几种不同病毒感染均可导致木乃伊



Parvovirus, Enterovirus, CSF, JEV, Pseudorabies, PRRS  
Encephalomyocarditis virus, Influenza virus can cause  
mummies.

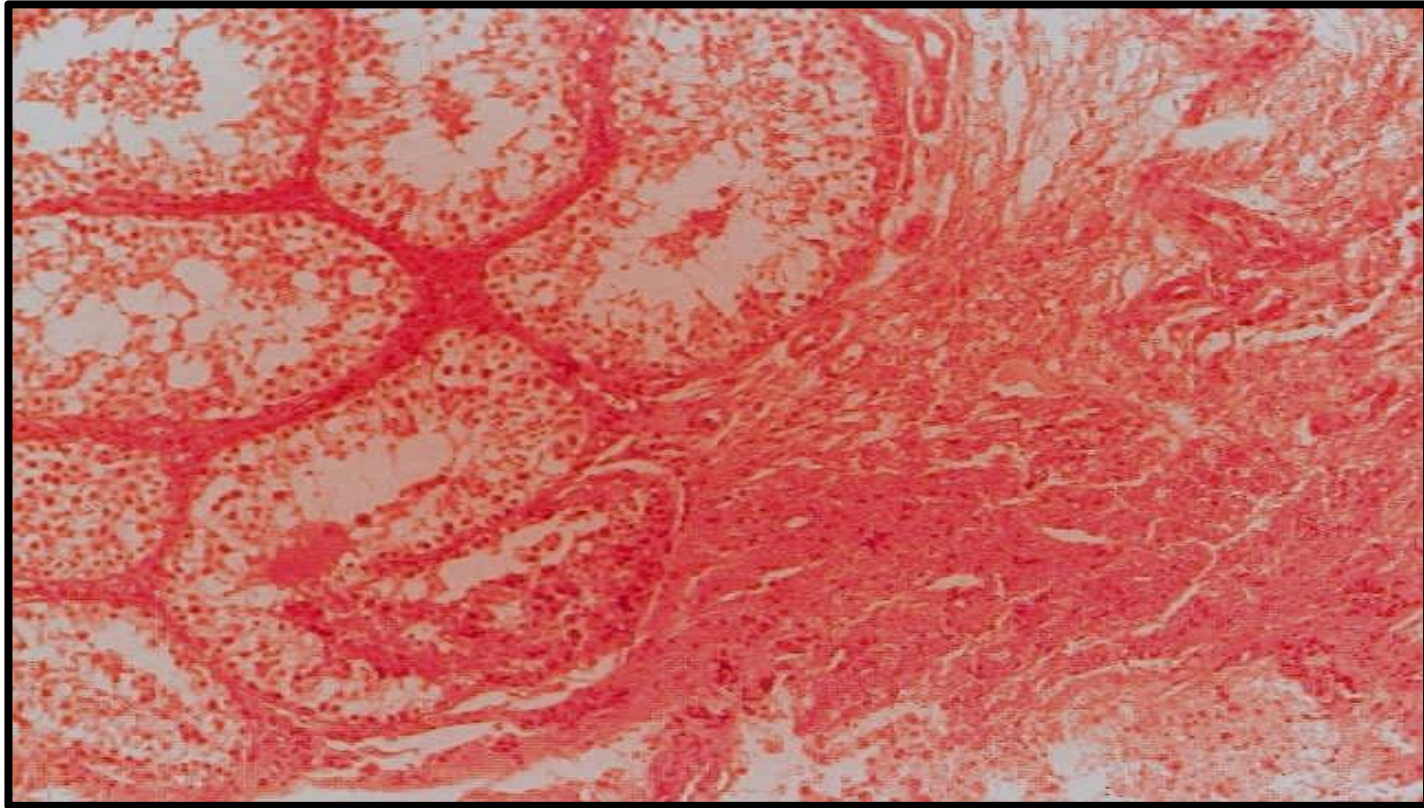
细小病毒，肠病毒，猪瘟病毒，日本乙脑病毒，伪狂犬病病毒，蓝耳病病毒，脑心肌炎病毒，流感病毒均可致木乃伊



Brucellosis  
布氏杆菌病



JEV  
日本脑炎



# Sow Not in Pig 母猪未妊娠



Viral infection  
病毒感染

Seasonal Infertility  
季节性不孕

Stress 应激 -  
Heat , Cold , Mixing , Crowding  
热、冷、混群、拥挤

Nutrition  
营养

Bacterial Infection  
细菌感染

## Mummies, Weak, Dead Pigs at Birth

木乃伊、弱仔、死胎

Viral Infection Sow too fat

Nutritional Deficiencies

Leptospirosis, other Bacteria

Mycotoxins

Infectious Anaemia

- 病毒感染
- 母猪太肥
- 营养不良
- 钩端螺旋体病，其他细菌
- 真菌毒素
- 传染性贫血

# Goal of Biosecurity

## 生物安全的意义

Protect the boars from production problems.  
预防公猪生产问题

Protect the sow herds served by the boar stud.  
保护接受公猪群配种的母猪群体

# Separation of Farm from the Outside World.

## 猪场与外部隔离



The world (Dirty 脏)



平遥

The World (dirty)  
外界（脏）

*Local control (dirty)* 局部控制（脏）

*Farm courtyard* 猪场院子

*Animal area*  
生产区域

- Six Compartment Exchange System
- 六段分隔系统

**IF?...WHY?**  
如果? ...为什么?

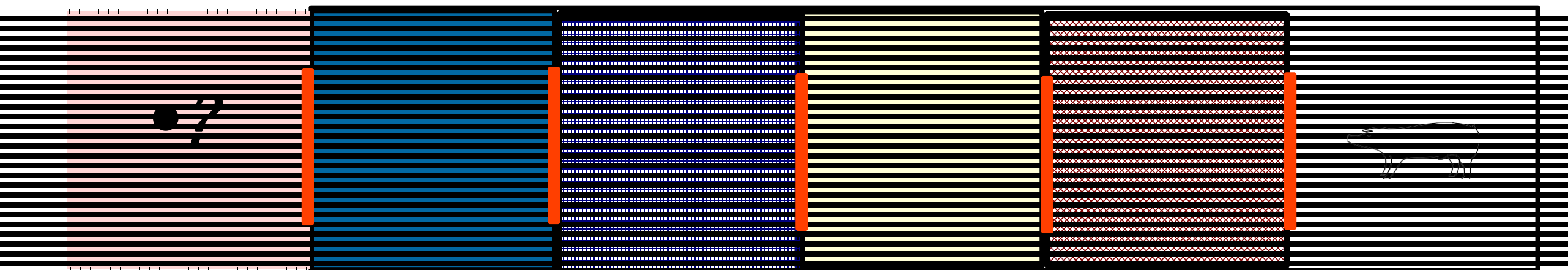
Dirty  
脏

Shower  
洗澡

• Courtyard  
• 场内院子

• Shower  
• 洗澡

• Clean  
• 干净



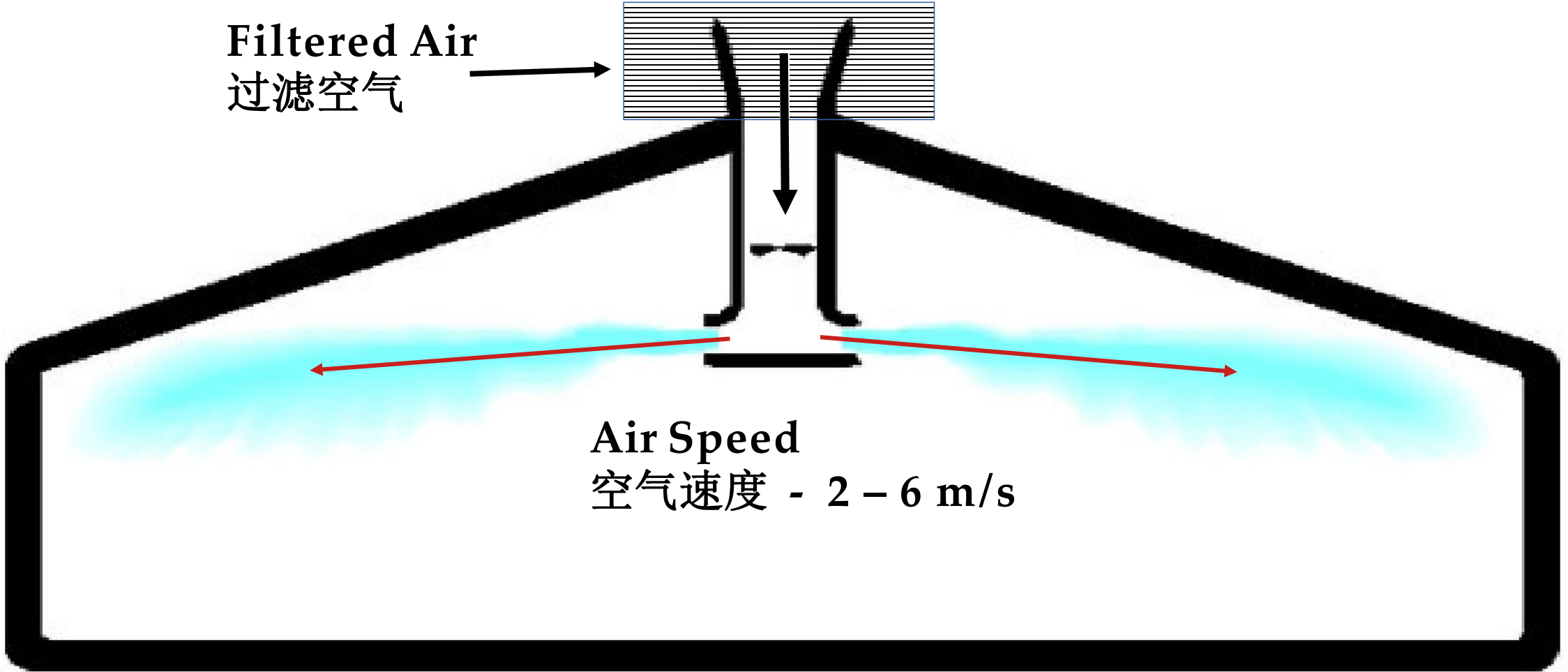
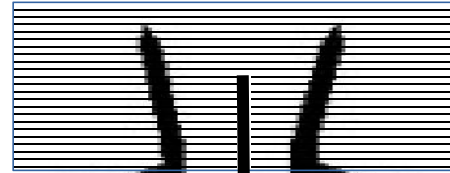
• Farm Entry  
• 进入猪场

# Mechanical Positive Pressure Ventilation



## 机械正压通气

Filtered Air  
过滤空气



Air Speed  
空气速度 - 2 - 6 m/s

# 猪场[厂]的非洲猪瘟输入项

猪肉

Feedstuffs  
饲料相关物品

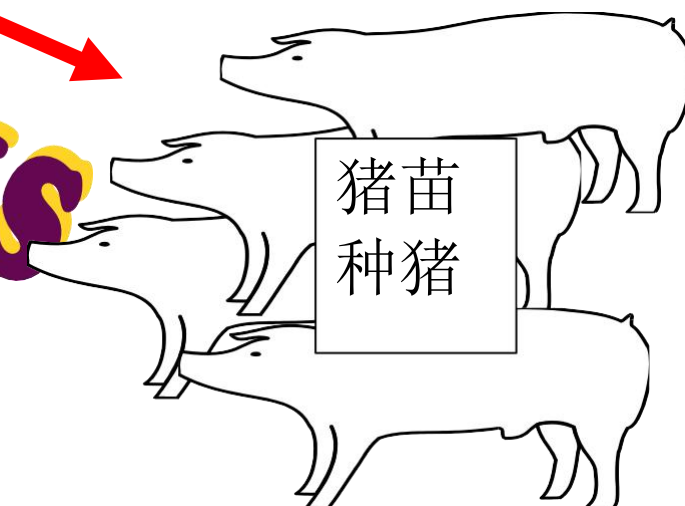


TRUCKS

TRUCKS

TRUCKS

TRUCKS



猪苗  
种猪



## Cleaning 清洁

NaOH, TSP, and similar alkaline agents are useful in cleaning but are corrosive to aluminum.

氢氧化钠，磷酸三钠，和类似的碱性物质对清洗很有帮助，但对铝有腐蚀性。

Hot water improves speed and effectiveness of cleaning.

热水可以提高清洗的速度和效率

Wood is very difficult to clean and its use should be avoided.

木头很难清洗干净，应该避免使用木头。

# Approvable Disinfectants for ASF

## 可核准的 ASF 消毒剂

Peroxymonosulfate Potassium salt  $\text{KHSO}_5$  (MPS, PMPS)

过一硫酸氢钾盐  $\text{KHSO}_5$  (MPS, PMPS)

Caro's acid  $\text{H}_2\text{SO}_5$  is neutralized with potassium carbonate to produce a safe product. 卡罗酸  $\text{H}_2\text{SO}_5$  和碳酸钾中和生产的安全产品 Is a powerful oxidizer. 一种强氧化剂

Effective at 0.5% actual MPS. 实际 MPS 含量 0.5% 就有效

Commercial products are combination of MPS and a surfactant such as dodecyl benzene sulfonate, a detergent.

商业产品会在过一硫酸氢钾中添加表面活性剂，比如十二烷基苯磺酸钠，一种去污剂

Inactivates ASF in 10 minutes. 10 分钟灭活 ASF

## • Approvable Disinfectants for ASF 可核准的 ASF 消毒剂



2nd Tier: 第二选择 : Glutaraldehyde, Formaldehyde. 戊二醛, 甲醛  
Aldehydes can inactivate ASF in about 30 minutes  
醛类灭活 ASF 大约需要 30 分钟

Glutaraldehyde is less volatile than formaldehyde (a gas).  
戊二醛的挥发性比甲醛（气体）弱。

Typical formulations of glutaraldehyde contain about 0.05% actual glutaraldehyde in water in the prepared solution. Commercial formulations usually contain a quaternary ammonium detergent. 经典的戊二醛配方是 0.05% 有效戊二醛，商用配方一般会含有季铵盐去污剂。

Formaldehyde fumigation is effective but seldom done.  
甲醛熏蒸有效，但很少执行。

# Major Health Problems Commonly Transmitted by Semen or Contamination of Semen 经常通过精液或者精液的污染而传播的主要健康问题

PRRS 蓝耳病

Pseudorabies 伪狂犬病

Porcine Epidemic Diarrhea 流行性腹泻病

PED/TGE-like related coronaviruses 类 PED/TGE 的相关冠状病毒病

Classical Swine Fever 猪瘟

Swine Dysentery??? (perhaps not...but...?)

猪痢疾 ??? (也许不是 ..... , 但是 ..... ? )

Brucella suis and Leptospirosis (Historically)

(历史来看, 猪布鲁氏菌病和钩端螺旋体病)

# Zero Tolerance Level

## 零容忍

Cull any boar that yields an uncertain test on a second monitoring.

淘汰在重复测定时结果不确定的公猪

Cull any boar that has repeated poor semen quality or is unthrifty or otherwise is 'junk'.

淘汰反复出现不合格精液，或者体质差，没有用的公猪

