Rabbit, Goat, Sheep, Poultry, Fish and Pig Farming

with Feed Technology
<table>
<thead>
<tr>
<th>Code:</th>
<th>ENI127</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format:</td>
<td>Paperback</td>
</tr>
<tr>
<td>Indian Price:</td>
<td>1100</td>
</tr>
<tr>
<td>US Price:</td>
<td>125</td>
</tr>
<tr>
<td>Pages:</td>
<td>564</td>
</tr>
<tr>
<td>ISBN:</td>
<td>8178330202</td>
</tr>
<tr>
<td>Publisher:</td>
<td>Pacific Business Press Inc.</td>
</tr>
</tbody>
</table>
Livestock and poultry in Indian tropical and subtropics play a critical role in agricultural economy by providing milk, wool, meat, eggs and draft power and provide flexible reserves during period of economic stress and buffer against crop failure. Rabbits are raised up off the ground and are one of the cleanest animals produced as meat and hence do not even need to be wormed. Rabbits are among the most productive of domestic livestock, making them efficient sources of food for an ever increasing population with diminishing resources. Up to 98.7% of the rabbits can be used for meat, fur, in laboratories, as fertilizers, in toys and novelties. The large demand for animal wool seems to be assured. Sheep rearing is the major source of livelihood to small and marginal farmers and landless laborers in hilly areas, arid and semi-arid region of India. Goat is a multi functional animal and plays a significant role in the economy and nutrition of landless, small and marginal farmers in the country. It creates employment to the rural poor besides effectively utilizing unpaid family labor. There is ample scope for establishing cottage industries based on goat meat and milk products and value addition to skin and fiber. Fish is a good source of animal proteins; Man has realized its importance from the very inception of the evolution of the human race. It has been the sole diet for many island nations before the evolution of farming techniques. Poultry is one of the fastest growing segments of the agricultural sector in India today. The production of agricultural crops has been rising at a rate of 1.5 to 2 % per annum that of eggs and broilers has been rising at a rate of 8 to 10 % per annum. From a backyard hobby it has culminated into an industry. Among the various livestock species, piggery is most potential source of meat production and more efficient feed converters after the broiler. Apart from providing meat, it is also a source of bristles and manure. Pig farming will provide employment opportunities to seasonally employed rural farmers and supplementary income to improve their living standards. The contribution of pork products in terms of value works out to 0.80% of total livestock products and 4.32% of the meat and meat products.

This book basically deals with rabbit keeping, feeding systems, feed requirements and balanced rations, angora wool utilization in cottage industries, useful information for goat breeding measures of increasing potential of range land nutrients requirements of goats, conversion efficiency of indigenous breeds of goats, sources and functions of the nutrients in sheep, breeds of poultry, inheritance of plumage in turkeys, commercial poultry farming, nutrition of broiler type chickens, how to economise on poultry feed cost, principles of fish culture, culturable fish and shellfish, nutritional requirement and artificial shrimp feed preparation, types of antibiotics for pigs etc.

This book provides detailed information on the livestock and poultry farming and rearing technique with described process of feeding systems, feed requirements and balanced rations, harvesting commercial products from them. This book is an invaluable resource for the entrepreneurs, institutions and professionals.

Content:
Chapter 1
RABBIT KEEPING
BASIC INFORMATION
SLAUGHTERING AND SKINNING
Chapter 2
BREEDS OF ANGORA RABBITS
IMPORTANT BREEDS WITH SALIENT CHARACTERS
EXTERNAL PARTS OF ANGORA RABBIT
SELECTION OF BREEDING STOCK
Chapter 3
NUTRITION AND FEEDING
ANTATOMY OF DIGESTIVE TRACT
PHYSIOLOGY OF DIGESTION
NUTRITIONAL REQUIREMENTS
TYPES OF FEED AND BALANCED PELLETED RATION
FEEDING SYSTEMS, FEED REQUIREMENTS AND BALANCED RATIONS
Chapter 4
GENETICS AND BREEDING
GENETICS
GENETIC IMPROVEMENT
Chapter 5
WOOL PRODUCTION
HARVESTING OF WOOL
ANGORA WOOL QUALITY AND COMPOSITION
ANGORA WOOL AND INDUSTRIAL UTILIZATION
ANGORA WOOL UTILIZATION IN COTTAGE INDUSTRIES
Chapter 6
BREEDS AND BREEDING OF GOATS
ORIGIN AND CLASSIFICATION OF GOATS
MODIFIED SCORE CARD FOR MEAT TYPE GOATS
DESIRABLE FEATURES FOR SELECTION OF GOATS
CENTRES OF RESEARCH ON GOATS
CENTRAL REGION: (RAJASTHAN, M.P., GUJARAT AND NORTH MAHARASHTRA)
QUALITY OF INDIAN BREEDS OF GOAT
USEFUL INFORMATION FOR GOAT BREEDING
NUMBER OF CHROMOSOMES OF DIFFERENT ANIMALS
Chapter 7
FEEDS AND FEEDING OF GOATS
DIGESTION IN GOATS
DIGESTION IN GOATS/SHEEP
CARE AND MANAGEMENT OF KIDS
FEEDING SCHEDULE OF KIDS
SCIENTIFIC APPROACH OF FEEDING DAIRY GOATS
FEEDING OF GOATS: A SCIENTIFIC APPROACH
USEFUL INFORMATION FOR GOAT BREEDINGMEASURES OF INCREASING POTENTIAL OF RANGE
SYSTEMS OF BREEDING IN POULTRY
SEXUAL MATURITY
BREEDING PLANS FOR IMPROVEMENT OF TURKEYS
Chapter 14
POULTRY BROODING
LOCATION OF BROODER HOUSE
BROODER HOUSE SCHEDULE UPTO 4 WEEKS OF AGE
Chapter 15
COMMERCIAL POULTRY FARMING
Chapter 16
INCUBATION AND HATCHERY
EXTRA EMBRYONIC MEMBRANES
Chapter 17
HATCHING OF EGGS
TESTING OF INCUBATED EGGS
HATCHERY MANAGEMENT
Chapter 18
DIGESTIVE SYSTEM OF POULTRY
THE DIGESTIVE PROCESS
Chapter 19
NUTRIENT REQUIREMENTS OF POULTRY
NUTRITION OF BROILER TYPE CHICKENS
Chapter 20
SALT AND TRACE MINERALS FOR POULTRY
TRACE MINERAL FOR POULTRY
Chapter 21
BREEDER FEEDS
Chapter 22
LAYER FEEDS
T PHASE FEEDING OF LAYING HENS
Chapter 23
BROILER FEEDS
Chapter 24
INCUBATION AND HATCHERY
POULTRY REPRODUCTION
EMBRYONIC DEVELOPMENT
EMBRYONIC NUTRITION
EMBRYONIC COMMUNICATION
EMBRYONNIC MORTALITY
HATCHERY SERVICES
Chapter 25
POULTRY FEEDING
METHODS OF FEEDING POULTRY
HOW TO ECONOMISE ON POULTRY FEED COSTT
Chapter 26
POULTRY NUTRITION
Chapter 38
HARVESTING OF PRAWNS BY AQUACULTRE
Chapter 39
SHRIMPS AND MARINE ENVIRONMENT
INTRODUCTION
Chapter 40
FISH PROTEIN CONCENTRATES
FISH-ENRICHED FARINACEOUS PRODUCTS
Chapter 41
SITE SELECTION FOR SHRIMP FARMING
A MANUAL ON SHRIMP FARMING
CONSTRUCTION IN AREAS OF ACID SULPHATE SOILS
Chapter 42
NUTRITIONAL REQUIREMENT AND ARTIFICIAL SHRIMP FEED PREPARATION
NUTRITIONAL REQUIREMENTS OF SHRIMPS
FEED INGREDIENTS
EQUIPMENTS USED IN ARTIFICIAL FEED PREPARATION
FARM MADE FEES
Chapter 43
SHRIMP FEED MANAGEMENT
TYPES OF SHRIMP FEED:
FEED USED IN DIFFERENT FARMING SYSTEMS
FEEDING HABITS
FEED PURCHASE AND STORAGE
Chapter 44
SHRIMP DISEASES
INFECTIOUS DISEASES:
BACTERIA
FUNGI
NON INFECTIOUS DISEASES
Chapter 45
PACKAGING OF FISH AND FISH PRODUCTS
Chapter 46
BREEDS AND BREEDING OF PIGS
CHARACTERISTICS OF INDIAN WILD BOAR:
SELECTION
BREEDING SYSTEMS
STARTING A PIG FARM
GUIDELINES FOR NORMAL REPRODUCTION OF PIGS
Chapter 47
FEEDS AND FEEDING OF PIGS
DIGESTION OF FOOD IN PIGS
UTILIZATION OF FOODSTUFFS
SUGGESTED REPLACEMENTS FOR FEEDS
TYPES OF ANTIBIOTICS FOR PIGS
Chapter 48
Sample Chapter:
BREEDS AND BREEDING OF PIGS

Pig has 38 somatic chromosomes. There are about 60 breeds of domestic pigs in the world.

CHARACTERISTICS OF INDIAN WILD BOAR (Sus Scrofa Cristatus)
Colour-rusty grey (in young), dark chestnut brown (in adults) snout-long ribs-short, ears-long, distinct sparse coat and full crest or name of black bristles running from nape down to the back. Male have both upper and lower tusks curving outwards from mouth. They live in groups of 10-20.

Pigmy Hog (sus salvanlus)
They live in the dense forest along the base of Himalayan in Sikkim, Nepal, Bhutan, Assam, Colour is brown/black, ears-small, slightly long hair on hind part of neck and middle of back: have no distinct crest. Adult animal measures about one foot (12 inches) and weigh approximately 7.5 kg. They also live in-group 18.

INDIGENOUS DOMESTICATED PIG
Have no distinct breed features. Therefore, characteristic very with topography and climatic conditions from region to region. This is black brown, grey, rusty-grey or blending/admixture of two or more of these colours. These are raised traditionally by weaker section of the community.

EXOTIC/IMPROVED BREEDS OF PIGS
1. REGION-WISE CLASSIFICATION OF PIGS

2. CLASSIFICATION OF SWINE BREEDS BASED ON UTILITY

Lard type e.g.
Bacon type e.g.
1. Duroc-jersy 1. Tammworth
2. Poland china 2. Yorkshire
3. Chester white
4. Berkshire
5. Hampshire
6. Spotted poland china

3. EXOTIC BREEDS EXPERIENCED IN INDIA
   1. Large white yorkshire
   2. Middle white yorkshire
   3. Saddle back
   4. Tamworth
   5. Berkshire

ACTORS AFFECTING SELECTION OF BREED
   1. Availability of good breeding stock
   2. Prolificacy
   3. Growth ability
   4. Temperament
   5. Carcass quality
   6. Efficient feed conversion
   7. Nicking ability
   8. Market demand
   9. Disease resistance

FACTORS FOR SELECTION OF BREEDING STOCK
   1. Size of litter (minimum eight piglets)
   2. Strength and vigour of litters
   3. Milking ability
   4. Temperature
   5. Gain and feed efficiency of progeny
   6. Longevity
   7. Fertility
   8. Free from defects
   9. Weaning weight of litter in gilts = 120 kg; in sow = 150 kg.

Note:
1. Selection of individual animals is more important than breed.
2. There are more differences within a breed than between breeds.

Characteristics of important breeder of Pigs Experienced in India
<table>
<thead>
<tr>
<th>ECONOMIC TRAITS OF SWINE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American breeds</strong></td>
<td></td>
</tr>
<tr>
<td>1. Poland China</td>
<td>e.g.</td>
</tr>
<tr>
<td>2. Duroc Jersey</td>
<td>China</td>
</tr>
<tr>
<td>3. Chester white</td>
<td></td>
</tr>
<tr>
<td>4. Hampshire</td>
<td></td>
</tr>
<tr>
<td>5. Spotted Poland</td>
<td></td>
</tr>
<tr>
<td><strong>British breeds</strong></td>
<td></td>
</tr>
<tr>
<td>1. Berkshire</td>
<td></td>
</tr>
<tr>
<td>2. Large white</td>
<td></td>
</tr>
<tr>
<td>3. Middle white</td>
<td></td>
</tr>
<tr>
<td>4. Tamworth</td>
<td></td>
</tr>
<tr>
<td>5. Large black</td>
<td></td>
</tr>
<tr>
<td>6. Essex</td>
<td></td>
</tr>
<tr>
<td>7. Wessex</td>
<td></td>
</tr>
<tr>
<td>8. Saddleback</td>
<td></td>
</tr>
<tr>
<td>9. Welsh</td>
<td></td>
</tr>
<tr>
<td>10. Cumberland</td>
<td></td>
</tr>
<tr>
<td>11. National long</td>
<td></td>
</tr>
<tr>
<td>12. Large white Duroc</td>
<td></td>
</tr>
<tr>
<td>13. Large white Welsh</td>
<td></td>
</tr>
<tr>
<td><strong>Central and South American breeds</strong></td>
<td></td>
</tr>
<tr>
<td>1. Berkshire</td>
<td></td>
</tr>
<tr>
<td>2. Large white</td>
<td></td>
</tr>
<tr>
<td>3. Middle white</td>
<td></td>
</tr>
<tr>
<td>4. Tamworth</td>
<td></td>
</tr>
<tr>
<td>5. Large black</td>
<td></td>
</tr>
<tr>
<td>6. Essex</td>
<td></td>
</tr>
<tr>
<td>7. Wessex</td>
<td></td>
</tr>
<tr>
<td>8. Saddleback</td>
<td></td>
</tr>
<tr>
<td>9. Welsh</td>
<td></td>
</tr>
<tr>
<td>10. Cumberland</td>
<td></td>
</tr>
<tr>
<td>11. National long</td>
<td></td>
</tr>
<tr>
<td>12. Large white Duroc</td>
<td></td>
</tr>
<tr>
<td>13. Large white Welsh</td>
<td></td>
</tr>
<tr>
<td><strong>Asian breeds</strong></td>
<td></td>
</tr>
<tr>
<td>1. Malayi</td>
<td></td>
</tr>
<tr>
<td>2. Balinese</td>
<td></td>
</tr>
<tr>
<td>3. Sumatra</td>
<td></td>
</tr>
<tr>
<td>4. Cantonese</td>
<td></td>
</tr>
<tr>
<td>5. Perfido</td>
<td></td>
</tr>
<tr>
<td>6. Perida</td>
<td></td>
</tr>
<tr>
<td>7. Japana</td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
</tr>
<tr>
<td>1. Danish</td>
<td></td>
</tr>
<tr>
<td>2. Other</td>
<td></td>
</tr>
</tbody>
</table>

*Note: The list above represents the economic traits of swine, with each trait followed by the related breeds.*
SELECTION
It includeds choosing the parents of next generation. Selection responses to a particular trait depends upon the selection differential and heritability of traits. The selection differential in standard deviation units is called intensity of selection.

1. PARAMETERS FOR APPRAISING GROWTH POTENTIAL
1. Average daily gain during specific post weaning period.
2. An Index combining-average daily gain, post weaning and weaning weight.

METHOD OF IMPROVEMENT
This depends upon the following:
1. Heritability of the characters.
2. Whether traits is sex-linked /limited.
3. Weather trait is measurable.

More direct the selection is, cheaper it will be, Emphasis must be given to relative cost efficiency of improvement by performance testing, progeny testing and nucleus hard testing.

Of these nucleus method is considerably cheaper and gives flexibility for introducing new genetic material and hence this is likely to be basis of all improvement schemes.

BREEDING SYSTEMS
1. INBREEDING
It involves mating of related animals for following purposes
1. To increase homozygosity in progeny
2. To develop inbred lines
3. To keep animals pure bred.
This system is not adopted commercially for the following adverse effects:
1. Decreases mean litter size with increase in age of pigs.
2. Causes slight decrease in post-weaning weight.
3. Causes decline in milking and mothering ability of sows.
4. Delays sexual maturity in pigs.
5. Decreases sex libido in boars.
6. Reduce fecundity and prolificacy, in general.

2. OUT BREEDING
It consists of mating of unrelated animals and systems of it are being extensively used for achievement of good results with regard to performance of pigs.
1. Out crossing
This is the common method of breeding and multiplying purebred swine which involves mating of unrelated animals of the same breed. Compared to inbreeding this system is better for crossing inbreds for following advantages.
1. Keeps animals pure bred.
2. Slight gain in litter size
3. Helps to regain the vigour in animals.
4. Some increase in livability and growth rate.

Limitations
1. Poor performance of inbreds.
2. Higher cost involved in development of inbred lines.

2. Grading-up
The non-descript indigenous pigs from the bulk of the pig population in the country. It involves use of improved breed with indigenous hogs. It will be advantage to grade up bulk of indigenous hogs by successive use of boars of large white Yorkshire or landrace breed. These two breeds were used in All India Coordinated Research project in the country. Following are the merit of this system.
1. Causes improvement in productive traits of vast population of nondescripts pigs in India.
2. Suited to areas where high quality pure breeds cannot be maintained due to poor management and feeding conditions.
3. Increases fertility and prolificacy in successive stages.

3. Crossbreeding
For commercial swine production programme it is common method used in area around bacon factories. It involves mating animals of two different breeds. i.e. crossing of Landrace sow with Yorkshire boar or vice-versa. Following are the merits of this method.
1. Fewer embryonic losses
2. Causes increase in litter size and uniform birth weight and weaning weight
3. Crossbred sow wean larger litter/more weight are weaning.
5. Increase in growth rate.
6. Early age of maturity
7. Increase livability of pigs and high and high vigour.
8. Regularity in breeding.  
9. Increased efficiency of feed conversion.  
10. Mothering ability and higher milk production.  

Table 1. Performance of Indigenous, exotic breed and crossbred in India  

<table>
<thead>
<tr>
<th>Traits</th>
<th>Desi</th>
<th>Middle/White Yorkshire</th>
<th>Crossbred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of piglet born dead.</td>
<td>7.68±0.61</td>
<td>7.84±0.801</td>
<td>3.87±0.43</td>
</tr>
<tr>
<td>Mean litter size</td>
<td>7.79±0.02</td>
<td>8.71±0.83</td>
<td>9.53±0.61</td>
</tr>
<tr>
<td>Mean birth weight of piglet (kg.)</td>
<td>0.90±0.02</td>
<td>1.34±0.03</td>
<td>1.23±0.04</td>
</tr>
<tr>
<td>Mean weaning weight (kg.)</td>
<td>4.02±0.23</td>
<td>7.01±0.30</td>
<td>6.65±0.36</td>
</tr>
<tr>
<td>Mean weight at 48 week (kg)</td>
<td>40.0±0.90</td>
<td>73.5±0.95</td>
<td>52.0±0.84</td>
</tr>
<tr>
<td>Growth rate from birth to weaning (kg.)</td>
<td>0.073</td>
<td>0.108</td>
<td>0.102</td>
</tr>
<tr>
<td>Feed Efficiency gain/ kg. of</td>
<td>5.57</td>
<td>5.40</td>
<td>5.70</td>
</tr>
<tr>
<td>Dressing percentage</td>
<td>75.91</td>
<td>76.36</td>
<td>78.88</td>
</tr>
</tbody>
</table>

Table 2. Growth and feed efficiency of indigenous and large white Yorkshire Pigs  

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indigenous variety</th>
<th>Large white Yorkshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial body weight</td>
<td>28.00±1.62</td>
<td>14.50±0.49</td>
</tr>
<tr>
<td>Final body weight at slaughter (kg.)</td>
<td>59.17±0.51</td>
<td>63.08±1.41</td>
</tr>
</tbody>
</table>

(A) Grower period (upto 35 kg. live weight)  

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indigenous variety</th>
<th>Large white Yorkshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pigs</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>Period to reach 35 kg weight</td>
<td>53±7 day</td>
<td>48±3 day</td>
</tr>
<tr>
<td>Feed consumed (kg./day)</td>
<td>1.28±0.10</td>
<td>1.35±0.03</td>
</tr>
<tr>
<td>Daily gain (g)</td>
<td>223±17</td>
<td>458±17</td>
</tr>
<tr>
<td>Feed per kg gain (kg.)</td>
<td>5.74</td>
<td>2.94</td>
</tr>
</tbody>
</table>

(B) Finisher period (upto slaughter)  

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indigenous variety</th>
<th>Large white Yorkshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pigs</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Period of reach slaughter weight (Days)</td>
<td>102±7</td>
<td>79±2</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Feed consumed (Kg./Day)</td>
<td>1.73±0.08</td>
<td>1.38±0.08</td>
</tr>
<tr>
<td>Daily gain (g)</td>
<td>250±18</td>
<td>363±19</td>
</tr>
<tr>
<td>Feed per kg gain (kg.)/FCR</td>
<td>6.93</td>
<td>3.92</td>
</tr>
</tbody>
</table>

(C)From initial weight to slaughter weight

<table>
<thead>
<tr>
<th>Sheet force value (1b/sq'')</th>
<th>Number of pigs</th>
<th>19</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period to reach slaughter weight</td>
<td>1.38±11 days</td>
<td>126±2 days</td>
<td></td>
</tr>
<tr>
<td>feed consumed (kg./day)</td>
<td>1.65±0.04</td>
<td>1.36±0.05</td>
<td></td>
</tr>
<tr>
<td>Daily gain (g)</td>
<td>2.44±1.5</td>
<td>3.85±14</td>
<td></td>
</tr>
<tr>
<td>Feed per kg gain (kg.)/FCR</td>
<td>6.74</td>
<td>3.52</td>
<td></td>
</tr>
</tbody>
</table>

Carcass characters-Quantitative:

<table>
<thead>
<tr>
<th>Dressed weight (kg.)</th>
<th>47.18±0.44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dressing percentage</td>
<td>80.06±0.64</td>
</tr>
<tr>
<td>Carcass length (cm)</td>
<td>62.63±0.61</td>
</tr>
<tr>
<td>Back fat thickness (cm)</td>
<td>3.02±0.54</td>
</tr>
<tr>
<td>Loin eye area (cm²)</td>
<td>18.73±0.54</td>
</tr>
<tr>
<td>Primal cuts (%)</td>
<td>65.85±6.47</td>
</tr>
<tr>
<td>Meat to bone ratio</td>
<td>3.38</td>
</tr>
<tr>
<td>Carcass characters-Qualitative</td>
<td>9.45±0.14</td>
</tr>
<tr>
<td>Fibre diameter (micon)</td>
<td>56.68±0.64</td>
</tr>
<tr>
<td>pH</td>
<td>5.59±0.02</td>
</tr>
<tr>
<td>Water holding capacity (Cm³)</td>
<td>1.40±0.5</td>
</tr>
<tr>
<td>Proximate composition of L. Dorsi muscle</td>
<td>Moisture %</td>
</tr>
<tr>
<td>Moisture %</td>
<td>71.52±0.27</td>
</tr>
<tr>
<td>Crude protein %</td>
<td>69.36±0.55</td>
</tr>
<tr>
<td>Ether extract %</td>
<td>24.64±0.25</td>
</tr>
<tr>
<td>Total ash %</td>
<td>4.58±0.15</td>
</tr>
</tbody>
</table>

STARTING A PIG FARM
For a medium size farm a unit of 10 sows and one boar will be enough. For a beginner a small unit of 5 sows and 1 boar will be advisable. For initial lower cost it will be better if started with young piglets.

**SELECTION OF BOAR**

Consider following parameters:

1. True to the breed
2. Masculine appearance
3. Long deep body
4. Strong legs and smooth shoulders
5. Sound health and performance record.
6. No cryptorchid condition.
7. Age between 1.5 to 2 years.
8. Select only fertile with well developed testes.
9. No overfat condition
10. Strong back
11. Active look.

**Note:**

1. A irritable boar difficult to drive and one who inclines to fight may transmit a nervous disposition to piglets. This may make them poor mothers.
2. The litter size has been found to vary significantly (p<0.01) between boars but not between seasons. This points out the necessity for selection of boars based on the litter size to obtain maximum offsprings.

**SELECTION OF SOWS**

Consider following parameters in view:

1. Sow must be from a litter whose litter size and weight at birth and weaning weight is maximum.
2. Have minimum back fat thickness.
3. Sow must have well developed under with twelve teats and at least 6 teats in each row, evenly distributed on belly sides.
4. Teat of sow must be free from any abnormality.
5. Sow must have deep body.
6. Select the sows that are already bred at least once.
7. Age of brood sows must be 2 to 3 years.
8. Sows must produce numerous young ones each year.
9. Sows must have good mothering ability.
10. Sows must be ready for rebreeding at the end of location.
11. Select gilt/sows that are healthy.
12. Sows offsprings must thrive well.
13. Sow must have quiet disposition.

**Note:** Many farmers make error of depending much on boar quality because boar is considered to be "half the herd" in the matter of inheritance, but in swine there are so many youngs. Motherliness of sow can make difference in raising 5 to 8 piglets out of 10 farrowed.

**CULLING OF ANIMALS**

**Boars**

1. Infertile ones
2. Boars of over 5 years age.
3. Irritable nature and nervous disposition.
4. Over fat and too heavy, finds difficult to mount.
5. Not true to the breed.
6. Cryptorchid.
7. Weak limbs.

Sows
1. One third of older sows annually.
2. Gilts or sows not settled after 4 days breeding period.
3. Nervous and irritable nature.
4. Produce small litter.
5. Sows with defective teats and poor milkers.
6. Sows with small vulva is an indication of internal reproductive defects.
7. Sows/gilts with inverted teats.
8. Gilts and sows which do not meet the standard of meaty hogs.

GUIDELINES FOR NORMAL REPRODUCTION OF PIGS

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at puberty</td>
<td>6 to 7 months</td>
</tr>
<tr>
<td>Breeding age of gilts</td>
<td>10 to 12 months</td>
</tr>
<tr>
<td>Breeding weight of gilts</td>
<td>90 to 100 kg.</td>
</tr>
<tr>
<td>Breeding age of boar</td>
<td>18 to 24 months</td>
</tr>
<tr>
<td>Number of sows per boar</td>
<td>10</td>
</tr>
<tr>
<td>Heat cycle</td>
<td>19-23 days (Ave.21)</td>
</tr>
<tr>
<td>Heat period</td>
<td>2-3 days</td>
</tr>
<tr>
<td>Mating time</td>
<td>Gilfts-first day of heat and second day of onset of heat in sows</td>
</tr>
<tr>
<td>Number of services per conception</td>
<td>Two at intervals of 12 to 14 hours.</td>
</tr>
<tr>
<td>Gestation period</td>
<td>112 to 114 days</td>
</tr>
<tr>
<td>Suckling period</td>
<td>56-60 days</td>
</tr>
<tr>
<td>Average litter size at birth</td>
<td>10 to 14</td>
</tr>
<tr>
<td>Average litter size at weaning</td>
<td>8 to 10</td>
</tr>
<tr>
<td>Rest period</td>
<td>45 days</td>
</tr>
<tr>
<td>Occurrence of heat after weaning</td>
<td>2 to 10 days</td>
</tr>
<tr>
<td>Period of mating</td>
<td>15 days after weaning</td>
</tr>
<tr>
<td>Volume of ejaculate</td>
<td>200 c.c.</td>
</tr>
<tr>
<td>Average number of sperms/cumm.</td>
<td>100,000</td>
</tr>
</tbody>
</table>
Average age to castrate pigs: 4 to 8 weeks
Market age of fattening pigs: 6 months
Market weight at 6 month: 70 to 75 kg.
Farrowing interval: 7 to 7½ month
Years-sows are known to breed: 8 to 10 years
Average life of sow: 6 litters.

**Note:** Boars with low protein intake have reduced libido. This reduction in libido may be a result of decreased estrogen concentration in circulation.

**MANAGEMENT AT BREEDING OF PIGS**
Freeding gilts and dry sows liberally to increase energy intake 10 to 15 days prior to mating is called flushing. It may be done as follows:
1. Feed leguminous hay (Cowpea/lucerne/berseem) for it supplies more protein, minerals and vitamins
2. Extra allowance of grains
3. Give multivitamin injection along with "Flushing"

**Note:**
1. Boars fed low of protein take longer to mount a dummy and start ejaculating and produce less sperms.
2. Pandey and Singh reported highly significant correlation coefficient between farrowing percentage and mean percentage of seminal characteristics of preserved boar semen.

**ADVANTAGES OF FLUSHING**
1. Improvement in physical condition of female
2. Prompt post weaning oestrus
3. Shows prominent heat symptoms.
4. Increases ovulation rate
5. Good litter size
6. Shortens period between weaning to successful conception.
7. High numbers born
8. More uniform litter size

**DETECTION OF "HEAT" IN SOWS**
Following are the symptoms of heat in sows:
1. Vulvar swelling and redness
2. Vaginal discharge
3. Urination frequently
4. Reduced appetite
5. Mounting behaviour
6. Immobility when normal manual pressure is applied on the back region (Limbo-Sacral) "Standing heat"
7. Restlessness and excitement.
8. Mucus discharge from vulva.
9. Peculiar grunting sound.
10. Erection of ears when pressure applied on back.

**OPTIMUM TIME TO BREED SOWS/GILTS**
Standing heat as directed by immobility of sow in oestrus particularly exhibited by erection of ears when manual pressure is applied on the back of sow.

**INFLUENCE OF BOAR CONTACT ON AGE AT PUBERTY IN GILTS**

Five minutes of daily contact with mature boar is sufficient to stimulate early puberty in gilts providing gilts have adequate opportunity for physical contact with the boars. Gilts that are of 165 days of age appear to require daily boar exposure to obtain rapid and maximum pubertal response.

---

**NIIR Project Consultancy Services (NPCS)** is a reliable name in the industrial world for offering integrated technical consultancy services. Its various services are: Pre-feasibility study, New Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Preparation of Project Profiles and Pre-Investment and Pre-Feasibility Studies, Market Surveys and Studies, Preparation of Techno-Economic Feasibility Reports, Identification and Selection of Plant and Machinery, Manufacturing Process and or Equipment required, General Guidance, Technical and Commercial Counseling for setting up new industrial projects and industry. NPCS also publishes various technology books, directory, databases, detailed project reports, market survey reports on various industries and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by Indian and overseas professionals including project engineers, information services bureau, consultants and consultancy firms as one of the input in their research.

**NIIR PROJECT CONSULTANCY SERVICES**

106-E, Kamla Nagar, New Delhi-110007, India.
Tel: 91-11-23843955, 23845654, 23845886, +918800733955
Mobile: +91-9811043595
Email: npcs.ei@gmail.com ,info@entrepreneurindia.co
Website: www.entrepreneurIndia.co