

**GAUTENG DEPARTMENT OF EDUCATION
SENIOR CERTIFICATE EXAMINATION**

APPLIED AGRICULTURAL SCIENCE SG

POSSIBLE ANSWERS OCT / NOV 2006

**QUESTION
DAIRY FARMING**

- 1.1
- Stage of lactation - after calf rapid rise - peak 30 to 60 days
 - Feeding and body reserves - rotation must contain sufficient energy, protein, crude fibre - feed properly during first 100 days
 - age - production rises at a decreasing tempo up to age of eight years, then declines at an increasing tempo
 - size of cow - larger more milk - not directly related
 - breed - different breed has different production
 - number of milkings - the more times being milked the higher the production
 - oestrus - temporarily decreased
 - dry period - dry period of 60 days is essential for good production
 - climate - drops if temperature rises above 28° or 30°C
 - exercise - moderate exercise promotes production
 - diseases - such as mastitis, ketosis and digestive disturbances can cause a decrease in production
- (8)
- 1.2
- Efficient control of diseases
 - Economical method of mating
 - Efficient method of cattle improvement
 - Adequate progeny is procreated
 - Accurate record holding
 - Semen can be kept for years
 - More than one bull
 - Semen can be imported
- (7)
- 1.3
- Large - well attached to body
 - extend well forward
 - high up between hind legs
 - quarters well developed
 - bottom flat
 - teats large, well spaced
 - veins prominent
- (6)
- 1.4
- External signs of heat is suppressed
 - Come on heat for shorter periods
 - Come on heat during the night
 - Period between heat periods lengthens
 - Four AI are necessary
 - Embryo re-absorption increases
 - Gestation period reduced
- (5)

- 1.5.1 Period from calving until cow has dried up - period in which milk is produced
- 300 days
- 1.5.2 Inflammation - caused by infection of udder by bacteria
- 1.5.3 Period from conception to calving usually 280 - 285 days - varies between
breeds (6)
- 1.6.1 Tandem milking parlour (2)
- 1.6.2 Cows to be handled individually
Cheap and simpler construction
Cow and milking system is visible
7,5 cows can be milked per hour (4)
- 1.6.3 Gates makes a lot of noise
Slide gate types require more steel
All cows have to be milked
Labourers have to walk great distances
Great construction and material cost per milking point (5)
- | | | | | |
|-----|--------------|-------|------------------------------------|-----|
| 1.7 | Roughages | Dry | Rich in protein
Poor in protein | (8) |
| | | Juicy | Rich in protein
Poor in protein | |
| | Concentrates | Dry | Rich in protein
Poor in protein | |
- 1.8 Sudden increase in gas formation caused by an increase in starch or
enzymes
Lowering of the surface tension of the fluid in rumen
Paralysis of the muscles of the rumen
Obstruction or occlusion of the oesophagus (8)
- 1.9 Sour taste - milk sugar changed to lactic acid
Unpleasant taste - fats decay
Shrub tastes - spring the shrubs are green
Fodder tastes - Lucerne, clover
Tastes due to udder disorders - mastitis
Stuffy taste - dirty cans
Absorbed tastes and odours (7)
- 1.10 Optimise the milk production per kg
Up to 2000 cows
Daily ration of concentrate is made available
Identifies cows not eating all their food
Very accurate
Various feeding methods
Constant rumen pH is obtained
Prints warning list
Fodder mixed automatically
Calf stations can be connected (10)

- 1.11 Must not cause injuries
Must not contribute to diseases
Must not cause stress
Floor materials must not deteriorate
Perforated floors must not hold manure or urine for long periods
Floors must be built at a slope (7)
- 1.12 Butter fat
Volume
Protein content
Somatic cell count
Bacteria count (5)
- 1.13.1 Economic value – eliminate injuries
Calves up to four weeks can be dehorned
Bolt is heated - to red hot
Press over bud for three seconds
Make circular movements (6)
- 1.13.2 Cards with skin covering is caught between jaws
Closure of jaws will crush the cards
Do one at a time
Don't catch the S shape part of
Don't let card slip out (5)
- 1.14 Spray dip
Immersion
Pour on
Hand or tractor spray
Hoof dip
Draining (3)

[100]

**QUESTION 2
MAIZE PRODUCTION**

- 2.1 8 million tons of grain produced
3.6 million ha
Largest areas Maize quadrangle
Utilized indirectly
Animal feed - end product meat, eggs
Maize meal - staple food
Processed for fuel (ethanol) and starch
Starch is changed by enzyme to products such as sorbitol, fruit sugar used
in household products (8)

- 2.2 Growth stage 6 - green mealie. Plant ear shoot and bracks fully develop. Starch begins to accumulate - mass kernel increase.
Growth stage 7 - soft dough. Grain mass continues to increase, sugars are converted to starch.
Growth stage 8 - hard dough. Sugars in kernels disappear.
Growth stage 9 - physiological maturity kernels has reached its maximum dry mass, layer of black cells develop no further translocation of nutrients.
Growth stage 10 - drying of kernels - drying rate takes place - need to reach 20% (10)
- 2.3.1 The object of soil tillage is to maintain the existing structure or to improve it. Cultivation may lead to the breaking down of the structure. Which limits the drainage, infiltration and limits root growth (3)
- 2.3.2 It's the mass per unit volume. Porosity is that portion that is filled with water and air. If bulk density increases. Tillage should obtain a balance between micro and macro pores. (3)
- 2.3.3 It is the ability to convey water under the influence of a force-like gravity. Most important factor affecting it is the distribution of pore size. Micro pores present the slowest water conductivity. (3)
- 2.4.1 Ripper
- 2.4.2 Primary - used to loosen the soil (2)
- 2.4.3 Break-up the soil layers
Improve drainage
Roots growth better (2)
- 2.4.4 Wet clay conditions, compact soil laterally and inwards, smear layer (2)
- 2.5 Higher application of herbicides
More management inputs
Special or adapted planters
Expensive planting
Compaction of soil
Leaf diseases may occur
Insect populations can be promoted (7)
- 2.6
- Never replace a reliable cultivar after one season with a new cultivar - first evaluate the unknown cultivar
 - A range of cultivars spreads risk / plant several cultivars that differ in growing season
 - Cultivars must be adapted to a specific yield potential
 - Revise the choice of cultivar annually - to adapt the changing conditions
 - Consider all the characteristics of a cultivar - do not select on one only (10)

- 2.7 Done after harvesting and before the first tilling
 This method is applicable to most maize production areas
 Representative samples of a 30 cm wide strip over the maize rows are analysed
 Samples are taken with a soil auger
 Depts 0-15 cm, 15-30 cm and 30-60 cm, five times for each 50 ha. Samples should be air dried.
 Samples submitted to the laboratory should have a mass of 500 to 1 000 g. (6)
- 2.8 N $\frac{2}{6}$ of 24%
 $24 \div 6 \times 2$
 $= 8$
- p $\frac{3}{6}$ of 24%
 $24 \div 6 \times 3$
 $= 12$
- K $\frac{1}{6}$ of 24%
 $24 \div 6 \times 1$
 $= 4$ (6)
- 2.9
- Wetting agents - reduce surface tension of droplets
 - Adhesive agents - cause spray droplets to adhere to the plant
 - Penetrators - enhance absorption of active ingredients
 - Suspension agents - to prevent changes in the spray mixture
 - Buffer - maintain the desirable pH
 - Droplet - control the size of the spray (12)
- 2.10 Combat diseases and insect pests
 Maintain high organic fraction
 Prevents one-sided utilisation of nutrients
 Economical way of maintaining soil fertility
 Two or more crops
 Crops have different root depths
 Decrease slack period
 Distributes the risk of crop failure (10)
- 2.11 Planting depth - if too deep may not emerge
 Too much fertilizer too close may cause burning
 Susceptible to drift sand damage
 Hail damage is possible
 Frost may cause damage to leaves
 Water logging may occur and be harmful to seedling
 Tilling too close may damage roots (8)

- 2.12 Shiny black - 12 mm long
 Damage subterranean stem - seedlings - eating holes
 During autumn, stems of older plants are frayed above the soil
 Brace roots are destroyed. (5)

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QUESTION 3

- 3.1 Water 73,7
 Protein 12,9
 Fat 11,5
 Ash 1,0 (4)
- 3.2 Eggs may become contaminated with pathogenic and spoilage micro-organisms
 Eggs are pasteurized to destroy bacteria
 Liquid whole eggs are heated at 60°C
 For 3½ minutes
 This effect has no effect on the performance of the eggs.
 Dried eggs can also be pasteurised to eliminate any contamination
 Dried whites containing not more the 3% moisture
 Can be held at 60-70°C (6)
- 3.3.1 Broil fryer 7-12 weeks 1,5 kg
 Roaster 3-5 months 4-5 kg
 Capon 8 months
 Rock Cornish hens 5-7 weeks (4)
- 3.3.2 Fryer - roaster
 Young hen
 Young tom
 Yearling hen
 Yearling tom
 Matured or old turkey (5)
- 3.5.1 Chief protein caseinogens
 Valuable body-builder
 Proteins such as lactalbumen and lactoglobulin also present
 Phosphorus + Calcium combine with protein (4)
- 3.5.2 Lactose or milk sugar
 Disaccharide also known as animal sugar
 Little sweetness - this is important otherwise people would get tired of milk (3)
- 3.6 Water 87%
 Lactose 4,5%
 Fat 4%
 Protein 3.5%
 Minerals 0,75% (5)

- 3.7 Do not leave milk bottles in sunlight - ideal opaque or cartons to prevent loss of Vit. C
 Leave bottles sealed if possible.
 Never add fresh milk to old milk
 Keep cool - ideally in a refrigerator
 Do not store near strong smelling food - give taste to milk (8)
- 3.8 Vitamins are destroyed
 Lactic acid bacteria are destroyed
 Germs are destroyed such as tuberculosis
 Casein is changed into less digestible form
 Fine emulsion of fat is destroyed (5)
- 3.9 When cream is too thick - fat globules cannot move easily - butter granules will not form. Sometimes will form very quickly - fatty mass - will not keep well.

 When cream is too thin - churning will take long - final result not good - 33 percent fat

 When temperature not right - too cold won't churn at all - too warm slack mass - 12-14°C

 Churn too full - don't fill full - only half - air will expand (7)
- 3.10 Skin - soil - contents of alimentary canal - hands of flyer - water - equipment - slaughtering place (5)
- 3.11 Very lean
 Lean
 Medium
 Fat
 Moderately over fat
 Excessively over fat (6)
- 3.12 1 Belly
 2 Breast
 3 Rib
 4 Loin
 5 Chump
 6 Thick Rib
 7 Shank
 8 Leg
 9 Head (9)
- 3.13.1 Special wood - oak - preserve the meat - slowing down enzyme action - preventing multiplication of bacteria - keeps longer (4)
- 3.13.2 Before refrigeration salting was used to preserve - milder cures which are less salty and better flavoured are available. Salt mixture is used - sodium nitrate - use correct mixture per unit of meat. (4)

- 3.14 Sanitary conditions throughout
 - Animal good health
 - Proper bleeding
 - Body temperature must drop as rapid as possible
 - Use good quality wrapping
 - Holding temperature below 0°C
 - Ageing of meat - restrict period

(7)
[100]

TOTAL: 300