

**POSSIBLE ANSWERS**  
**OCT / NOV 2006**

AGRICULTURAL SCIENCE/P2/SG 2  
SENIOR CERTIFICATE EXAMINATION - 2006

**SECTION A**

**QUESTION 1**

1.1 Multiple choice

1.1.1 C✓✓ (2)

1.1.2 C✓✓ (2)

1.1.3 B✓✓ (2)

1.1.4 D✓✓ (2)

1.1.5 B✓✓ (2)

[10]

1.2 Correct terms

1.2.1 Demand✓✓ (2)

1.2.2 Cross-breeding✓✓ (2)

1.2.3 Greenhouse / tunnel / glasshouse / fibreglass house✓✓ (2)

1.2.4 Artificial insemination (A.I.)✓✓ (2)

1.2.5 Mulching✓✓ (2)

[10]

1.3 Matching the columns

- 1.3.1 E✓✓ (2)
- 1.3.2 G✓✓ (2)
- 1.3.3 J✓✓ (2)
- 1.3.4 B✓✓ (2)
- 1.3.5 F✓✓ (2)

[10]

**TOTAL SECTION A: 30**

**SECTION B**

**QUESTION 2 : ANIMAL NUTRITION**

2.1 Digestive tract of the chicken

- 2.1.1 B - proventriculus/glandular stomach✓ (1)
- C - gizzard/ventriculus/granular stomach/molatic/muscular stomach✓ (1)
- D - oesophagus/gullet/food pipe✓ (1)
- E - caecum/blind-gut✓ (1)
- F - small intestine/duodenum/jejunum✓ (1)
- 2.1.2 A - storage/moistening/soaking of food✓ (1)
- H - excretion of faeces and urine/reproductive organs/mating organ✓ (1)
- 2.1.3 B✓ (1)

2.2 Concentrates:

- high percentage of digestible nutrients/high nutritive value✓
- not bulky✓
- expensive✓
- low crude fibre content✓

(Any 2) (2)

Roughages:

- low percentage digestible nutrients/low nutritive value✓

bulky per unit mass✓

high crude fibre content✓

less expensive✓

(Any 2)

(2)

2.3

animal factors/type of animal✓

individuality of animal✓

time spent in alimentary canal✓

food composition/CF content✓

ration composition/nitrogen supplement✓

preparation of feed✓

nutritive ratio✓

level of feeding/quantity taken in/consumed✓

age of animal✓

age of plants✓

(Any 5)

(5)

2.4

glucose absorbed is changed into glycogen and stored✓

detoxifies poisons absorbed by bloodstream✓

stores fat soluble vitamins (A, K, D and E) ✓

stores copper and iron✓

helps in forming blood, especially in young animals✓

secretes heparin, prevents blood from clotting✓

synthesis of certain proteins such as plasma albumin, fibrinogen and prothrombin✓

secretes bile, stored in gallbladder until required in small intestine✓

(Any 5)

(5)

2.5

$$\text{Digestible dry material} = \frac{[15\text{kg} - (15\text{kg} \times 15\%)]}{100} - \frac{[6\text{kg} - (6\text{kg} \times 20\%)]}{100}$$

$$= (15\text{kg} - 2.25\text{kg}) - (6\text{kg} - 1.2\text{kg})$$

$$= 12.75\text{kg} - 4.8\text{kg}$$

$$= 7.95\text{kg}/8\text{kg}$$

(5)

2.6

Mineral nutrition

2.6.1

do not possess sufficient iron reserves✓ ✓

**Any 1 mark from the following**

no exposure to the iron in soil✓

(2)

- sow's milk insufficient in iron for growing piglets✓  
 demand for iron very high for blood production✓  
 body cannot keep up with demand for blood✓ (1)
- 2.6.2 iron injection for piglets within 10 days of birth✓  
 access to red soil/soil✓  
 dosing of iron capsules✓ (Any 2) (2)
- 2.6.3 with calcium and vitamin D important for bone and tooth formation✓  
 component of protein in the soft tissues of the body e.g. cell membrane✓  
 important for optimum milk and egg production✓  
 involved in various metabolic processes, especially carbohydrate  
 metabolism✓ (3)  
 plays role in the mechanism of muscular contractions✓ (Any 3)

[35]

**QUESTION 3 : ANIMAL REPRODUCTION**

- 3.1 Reproductive organs of the bull
- 3.1.1 A - vesicular gland✓ (1)  
 C - prostate gland✓ (1)  
 D - urethra✓ (1)  
 E - vas deferens/seminal tubes/ductus deferens (1)  
 I - epididymis✓ (1)
- 3.1.2 A secretes sticky yellowish fluid ✓  
 provides nutrition for spermatozoa✓  
 corrects pH of the seminal fluid✓  
 corrects osmotic pressure of seminal fluid✓ (Any 1) (1)
- C improve mobility of sperms✓  
 lubricates and cleans urethra✓  
 corrects pH of seminal fluid✓ (Any 1) (1)
- D transports urine from the bladder✓  
 transports semen✓

(1)

accessory sex glands open into urethra✓ (Any 1)

E transports sperms✓  
stores sperms✓ (Any 1) (1)

I stores sperms✓  
transports sperms✓  
sperms reach maturity✓  
sperms gain mobility/motility✓  
secretes buffer which protects the sperm from acid secretions in the female✓ (Any 1) (1)

3.1.3 **1 mark for the problem and 1 mark for explanation or if the learner mentioned two factors affecting sterility 2 marks can be credited**

(a) failure of one or both testes to descend from abdominal cavity/cryptorchidism ✓  
scrotal hernias✓  
congenital sperm defects, acrosomal head or tail defects ✓ (2)  
hypoplasia/underdevelopment of the testes ✓ (Any 2)

(b) high environmental temperatures may cause increase in testicular temperature✓  
harmful to the formation of spermatozoa in seminiferous tubules✓  
stored sperm in epididymis can also be destroyed✓ (2)  
bulls not adapted to high temperatures have temporary infertility✓ (Any 2)

(c) sperm formation✓  
volume✓  
quality of semen negatively affected✓  
no or poor fertilisation✓ (2)  
bulls must be fed to be fit and not fat✓ (Any 2)

3.2 Functions of female hormones

3.2.1 preparing the uterus for reception of fertilised ovum✓  
implantation of embryo✓  
nourishment of embryo✓  
development of mammary glands✓

- maintenance of pregnancy✓  
 suppresses/delays secretion of FSH✓ (Any 1) (1)
- 3.2.2 prepares the uterus for the reception of the fertilised ovum✓  
 increases blood supply to the uterus✓  
 causes cervical muscles to relax ✓  
 prevents bacterial infection during oestrus✓  
 characteristics of oestrus✓ (Any 1) (1)
- 3.2.3 causes the ripe follicle to burst and release the ovum/ovulation✓  
 development of the corpus luteum✓ (Any 1) (1)
- 3.3 Artificial insemination (A.I.)
- 3.3.1 restlessness, cow walks around✓  
 lowers and arches (lowers) her back✓  
 sudden drop in milk production/lactation✓  
 drop in food intake/loss of appetite✓  
 cow will mount other cows✓  
 allow them to mount her/mud or dung marks on her back✓  
 she has a swollen/reddened vulva✓  
 slimy, mucous discharge from the vulva is present/bullstring✓  
 isolating herself from the herd✓ (Any 6) (6)
- 3.3.2 instruments used must be sterile/free from germs or bacteria✓  
 use of healthy semen✓  
 correct techniques must be applied✓  
 correct apparatus must be used✓  
 insemination take place at correct time of oestrus✓ (Any 4) (4)
- 3.4 Breeding methods
- 3.4.1 **Definition correct 2 marks or 1 mark for an example**  
 mating of animals that are closely related✓ ✓  
 e.g. father x daughter, mother x son ✓  
 produce a high percentage of homozygosity✓ (2)

- 3.4.2 mating of two pure bred animals of different breeds✓ ✓  
 e.g. Hereford bull x Angus cow✓  
 maximises heterosis✓ (2)
- 3.4.3 (a) Crossbreeding✓ (1)  
 (b) Inbreeding✓ (1)

**35****QUESTION 4 : OPTIMAL RESOURCE UTILISATION**

- 4.1 use of pesticides in concentrations that are too high✓  
 careless application of pesticides✓  
 unnecessary use of pesticides✓  
 pollution of drinking water occurs through soil erosion✓  
 incorrect irrigation practices e.g. flood irrigation✓  
 overgrazing causes an increase of poisonous plant species✓ (Any 5) (5)
- 4.2 storage of water for drought periods✓  
 water storage is extremely capital extensive undertaking (costly)✓  
 state control of natural resources and the use of resources effectively✓  
 to protect citizens against flooding✓  
 government is responsible for equal distribution of water✓  
 generate revenue ✓ (Any 3) (3)
- 4.3  $E_t = E_o \times f$   
 $= 10\text{mm} \times 0.7$ ✓  
 $= 7\text{mm}$ ✓  
 $90\text{mm} - 7\text{mm}$ ✓  
 $= 83\text{mm}$  moisture available✓ (4)
- 4.4. prepare a fine tilth/seedbed✓  
 control weeds✓

incorporate organic matter/fertiliser✓

incorporate inorganic fertilisers/amendments (lime and fertiliser)✓

improve aeration✓

improve drainage✓

better root penetration✓

destroy surface crust for water infiltration✓

destroy impermeable layers in the subsoil✓

(Any 5) (5)

4.5

scrub/macchia/fynbos✓

forest types✓

savanna/savannah✓

grasslands✓

semi-deserts/karoo✓

(5)

4.6

labour saving/economical✓

effective weed control✓

pest control✓

water saving✓

adaptable to steep slopes/terrain✓

running costs are lower/economical✓

relatively cheaper to install/economical✓

used on shallow soils with low water capacity✓

suitable for widely spaced row crops✓

(Any 3) (3)

[25]

## QUESTION 5 : AGRICULTURAL ECONOMICS

5.1 Case study

5.1.1

producer receives the average of all the sales during a specific year✓

producers receive a guaranteed price which gives them financial security✓

protects producers against price fluctuations✓

against very low prices which could be the case had they marketed on their own✓

reduces marketing costs/cost effective as the farmers do not have to build their own storage facilities✓



	ensures orderly and effective marketing✓		
	simplifies management and bookkeeping✓	(Any 5)	(5)
5.1.2	forms the basis of co-operative marketing✓		
	as the products from an individual producer are first graded✓		
	then pooled/placed in a pool together with products from other members✓		
	pooled products are treated, handled and stored as a unit✓		(4)
5.2	certain services can be rented instead of being bought✓		
	e.g. combine harvester, etc.✓		
	machinery or implements can be bought✓		
	e.g. two or more farmers buy together and share✓		
	the farmer can extend his capital✓		
	e.g. by making use of credit/loan✓		(6)
5.3	price of other competing products✓		
	production costs✓		
	technology✓		
	nature✓		
	profit margin of the product✓		
	stability of the product✓		
	period/season of production✓	(Any 4)	(4)
5.4	provides space✓		
	source of all raw materials✓		
	provides food✓		
	source of minerals✓		(4)
5.5	casual workers / contract workers✓		
	seasonal workers✓		(2)
			[25]
	<b>TOTAL SECTION B:</b>		<b>120</b>
	<b>GRAND TOTAL :</b>		<b>150</b>

**AFDELING A**

**VRAAG 1:**

**1.1: MEERVOUDIGE KEUSE-VRAE**

1.1.1 C ✓✓

1.1.2 C ✓✓

1.1.3 B ✓✓

1.1.4 D ✓✓

1.1.5 B ✓✓

(5 x 2) (10)

**1.2: KORREKTE TERME**

1.2.1 Vraag ✓✓

1.2.2 Kruisteling ✓✓

1.2.3 Kweekhuis/tonnel/ghashuis/glasvesel huise ✓✓

1.2.4 Kunsmatige inseminasie (K.I.) ✓✓

1.2.5 Deklaag/Bedekking ✓✓

(5 x 2) (10)

**1.3: PASITEMS**

1.3.1 E ✓✓

1.3.2 G ✓✓

1.3.3 J ✓✓

1.3.4 B ✓✓

1.3.5 F ✓✓

(5 x 2) (10)

**TOTAAL AFDELING A: 30**

**AFDELING B****VRAAG 2: DIEREVOEDING**

- 2.1 Spysverteringskanaal van hoender
- 2.1.1 B – Proventrikel/Spiermaag ✓ (1)  
 C – Krop/Ventrikel/ spiermaag ✓ (1)  
 D – Slukderm/Esophagus ✓ (1)  
 E – Caecum/sakderm ✓ (1)  
 F – Dunderm/duodenum/jejunum ✓ (1)
- 2.1.2 A – bergplek/bevogting/week van voedsel/sagmaak van voedsel ✓ (1)  
 H – uitskeiding van faeces en urine/voortplantingsorgane ✓ (1)
- 2.1.3 B ✓ (1)
- 2.2 Kragvoer: [enige 2]  
 Hoë persentasie verteerbare voedingstowwe/hoë voedingswaarde ✓  
 Nie lywig nie ✓  
 Duur ✓  
 Lae ruveselinhoud ✓ (2)
- Ruvoer: [enige 2]  
 Lae persentasie verteerbare voedingstowwe/Lae voedingswaarde ✓  
 Lywig per massa-eenheid ✓  
 Hoë ruveselinhoud ✓  
 Goedkoper ✓ (2)
- 2.3 [enige 5]  
 ■ Dierefaktore/tipe dier/soort dier ✓  
 ■ Individualiteit van dier ✓  
 ■ Voedselsamestelling/van inhoud ✓  
 ■ Rantsoensamestelling/stikstof aanvulling ✓  
 ■ Voorbereiding van voer ✓  
 ■ Voedingsverhouding ✓  
 ■ Vlak van voeding/hoeveelheid ingeneem ✓  
 ■ Ouderdom van dier ✓  
 ■ Ouderdom van plante ✓  
 ■ Tyd in spysverteringskanaal deurgebring ✓ (5)

- [enige 5]
- Die glukose geabsorbeer word verander in glikogeen en gestoor ✓
- Ontgiftig gifstowwe wat deur bloedstroom geabsorbeer is ✓
- Stoor vetoplosbare vitamene (A, K, D en E) ✓
- Stoor koper en yster ✓
- Help met die vorming van bloed, veral in jong diere ✓
- Skei heparien af, voorkom dat bloedklonte vorm ✓
- Sintese van sekere proteïene soos plasma-albumien, fibrinogeen en protrombien ✓
- Skei gal af wat in galblaas gestoor word totdat dit deur dunderm benodig word ✓

(5)

2.5 Verteerbare droë materiaal

$$= \left[ 15 \text{ kg} - \frac{(15 \text{ kg} \times 15\%)}{100} \right] \checkmark - \left[ 6 \text{ kg} - \frac{(6 \text{ kg} \times 20\%)}{100} \right] \checkmark$$

$$= (15 \text{ kg} - 2,25 \text{ kg}) - (6 \text{ kg} - 1,2 \text{ kg}) \checkmark$$

$$= 12,75 \text{ kg} - 4,8 \text{ kg} \checkmark$$

$$= 7,95 \text{ kg} / 8 \text{ kg} \checkmark$$

(5)

2.6 Mineralevoeding

2.6.1 [enige 3]

- Het nie voldoende ysterreserwes nie ✓
- Nie blootgestel aan yster in grond nie ✓
- Sog se melk het nie voldoende yster vir groeiende varkies nie ✓
- Vraag na yster baie hoog vir bloedproduksie ✓
- Liggaam kan nie byhou met vraag na bloed nie ✓

(3)

2.6.2 Ysterinspuiting vir varkies binne 10 dae van geboorte ✓

Toegang tot rooi grond /grond ✓

Dosering van ysterkapsules ✓

(2)

2.6.3 [enige 3]

- saam kalsium en vitamien D belangrik vir been- en tandvorming ✓
- komponent van proteïene in die sagte weefsel van die liggaam, bv. selmembrane ✓
- belangrik vir optimale melk- en eierproduksie ✓
- betrokke by verskeie metaboliese prosesse, veral koolhidraat-metabolisme ✓
- speel rol in die meganisme van spiersametrekkings ✓

(3)

[35]

**VRAAG 3: DIEREPRODUKSIE****3.1 Voortplantingsorgane van die bul**

- 3.1.1 A – vesikulêre klier ✓ (1)  
 C – prostaatklier ✓ (1)  
 D – uretra ✓ (1)  
 E – vas deferens/spermbuise/ductus deferens ✓ (1)  
 I – epididimus ✓ (1)
- 3.1.2 A – skei taai gelerige vloeistof af ✓  
 verskaf voeding aan spermatozoë ✓  
 korrigeer pH van die seminale vloeistof ✓  
 korrigeer osmotiese druk van seminale vloeistof ✓ [enige 1] (1)
- C – verbeter beweeglikheid van sperms ✓  
 smeer en maak uretra skoon ✓  
 korrigeer pH van seminale vloeistof ✓ [enige 1] (1)
- D – vervoer urine vanaf die blaas ✓  
 vervoer semen ✓  
 bykomende geslagskliere maak oop in die uretra ✓ [enige 1] (1)
- E – vervoer sperms ✓  
 stoor sperms ✓ [enige 1] (1)
- I – stoor sperms ✓  
 vervoer sperms ✓  
 sperms bereik volwassenheid ✓  
 sperms verkry beweeglikheid ✓  
 skei buffer af wat die sperm beskerm teen suur afscheidings in die vroulike dier ✓ [enige 1] (1)
- 3.1.3 (a) [enige 2]  
 ▪ onvermoë van een of albei testes om uit buikholte te sak/kriptorkidisme ✓  
 ▪ balsakbreuke/oskeoseel ✓  
 ▪ aangebore spermdefekte, akrosomale kop- of stertdefekte ✓  
 ▪ hipoplasie/onderontwikkeling van die testes ✓ (2)
- (b) [enige 2]  
 ▪ hoë omgewingstemperature kan verhoging in testikulêre temperatuur veroorsaak ✓  
 ▪ skadelik vir die vorming van spermatozoë in saaddraende buise ✓  
 ▪ gestoorde sperms in epididimus kan ook vernietig word ✓  
 ▪ bulle wat nie by hoë temperature aangepas is nie, ondervind tydelike onvrugbaarheid ✓ (2)

- (c) [enige 2]
- spermvorming ✓
  - volume ✓
  - gehalte van semen negatief beïnvloed ✓
  - geen of swak bevrugting ✓
  - bulle moet gevoer word om fiks te wees, nie om vet te wees nie ✓
- (2)

### 3.2 Funksies van vroulike hormone

- 3.2.1 [enige 1]
- voorbereiding van uterus vir ontvangs van bevrugte ovum ✓
  - inplanting van embrio ✓
  - voeding van embrio ✓
  - ontwikkeling van melkkliere ✓
  - verkraag afskeiding van FSH ✓
  - volhouding/instandhouding van swangerskap ✓
- (1)

- 3.2.2 [enige 1]
- berei die uterus voor vir die ontvangs van die bevrugte ovum ✓
  - verhoog bloedtoevoer na die uterus ✓
  - veroorsaak dat servikale spiere ontspan ✓
  - voorkom bakteriële infeksie tydens estrus ✓
  - kenmerke van estrus ✓
- (1)

- 3.2.3 [enige 1]
- veroorsaak dat ryp follikel oopbars en die ovum vrylaat/ovulasie ✓
  - ontwikkeling van die corpus luteum ✓
- (1)

### 3.3 Kunsmatige inseminasie (KI)

- 3.3.1 [enige 6]
- rusteloosheid, koei loop rond ✓
  - laat sak haar rug, maak rug krom (laag) ✓
  - skielike afname in melkproduksie/laktasie ✓
  - afname in voedselinname/verlies van aptyt/eetlus ✓
  - koei sal ander koeie bespring ✓
  - sal ander toelaat om haar te bespring/modder- of mismmerke op haar rug ✓
  - haar vulva is geswel en rooi ✓
  - slymerige afskeiding uit vulva is teenwoordig/'bullstring' ✓
  - isoleer haarself van die kudde ✓
- (6)

- 3.3.2 [enige 4]
- instrumente gebruik moet steriel wees ✓
  - gebruik gesonde semen ✓
  - korrekte tegniek moet toegepas word ✓
  - korrekte apparaat moet gebruik word ✓
  - inseminasie moet op regte tyd tydens estrus plaasvind ✓
- (4)

3.4 Teelmetodes

3.4.1 [enige 2]

- paring van diere wat na aan mekaar verwant is ✓
  - bv. vader x dogter, moeder x seun ✓
  - produseer 'n hoë persentasie homosigositeit ✓
- (2)

3.4.2 [enige 2]

- paring van twee rasegte diere van verskillende rasse ✓
  - bv. Hereford-bul x Angus-koei ✓
  - maksimaliseer heterose/basterkrag ✓
- (2)

3.4.3 (a) Kruisteling ✓

(1)

(b) Inteling ✓

(1)

[35]

**VRAAG 4: OPTIMALE HULPBRONBENUTTING**

4.1 [enige 5]

- gebruik van plaagdoders in te hoë konsentrasies ✓
  - nalatige aanwending van plaagdoders ✓
  - onnodige gebruik van plaagdoders ✓
  - besoedeling van drinkwater vind plaas deur gronderosie ✓
  - verkeerde besproeiingspraktyke, bv. vloedbesproeiing ✓
  - oorbeweiding veroorsaak 'n toename in giftige plantspesies ✓
- (5)

4.2 [enige 3]

- berg van water in droogtetydperke ✓
  - waterberging is 'n uiters kapitaal-intensiewe onderneming (duur) ✓
  - staatsbeheer van natuurlike hulpbronne en die doeltreffende gebruik van hulpbronne ✓
  - om burgers teen vloed te beskerm ✓
  - staat verantwoordelik vir gelyke verdeling van water ✓
  - genereer inkomste ✓
- (3)

4.3 Et =  $E_o \times f$   
 =  $10 \text{ mm} \times 0,7$  ✓  
 =  $7 \text{ mm}$  ✓

$900 \text{ mm} - 7 \text{ mm}$  ✓  
 =  $83 \text{ mm}$  vog beskikbaar ✓

(4)

- 4.4 [enige 5]
- berei 'n goeie krummelrige toestand/saadbed voor ✓
  - beheer onkruid ✓
  - inkorporeer organiese materiaal/kunsmis ✓
  - inkorporeer anorganiese kunsmisse/ kalk en bemestingsstowwe ✓
  - verbeter belugting ✓
  - verbeter dreinerings ✓
  - beter wortelindringing ✓
  - vernietig grondlae in ondergrond ✓
  - vernietig oppervlakkors vir waterinfiltrering ✓
- (5)
- 4.5 struikgewas/fynbos/kreupelhout ✓  
woudtipes ✓  
savanna ✓  
graslande ✓  
semi-woestyne/karoo ✓
- (5)
- 4.6 [enige 3]
- arbeidsbesparend/ekonomies ✓
  - doeltreffende onkruidbeheer ✓
  - plaagbeheer ✓
  - waterbesparend ✓
  - aanpasbaar by steil hellings/terrein ✓
  - bedryfskoste is laer/ekonomies ✓
  - geskik vir wydverspreide gewasse in vlakgrond met lae waterkapasiteit ✓
  - relatief goedkoop om te installeer/ekonomies ✓
- (3)  
**[25]**

## VRAAG 5: LANDBOU-EKONOMIE

### 5.1 Gevallestudie

- 5.1.1 [enige 5]
- produsent ontvang die gemiddeld van al die verkope tydens 'n spesifieke jaar ✓
  - produsente ontvang 'n gewaarborgde prys wat hulle finansiële sekuriteit gee ✓
  - beskerm produsente teen prysskommelings/-fluktuasies ✓
  - teen baie lae pryse wat die geval kon wees as hulle self bemark het ✓
  - verminder bemarkingskoste/koste-effektief aangesien boere nie hulle eie stoorfasiliteite hoef te bou nie ✓
  - verseker ordelike en doeltreffende bemarking ✓
  - vereenvoudig bestuur en boekhouding ✓
- (5)
- 5.1.2 vorm die basis van koöperatiewe bemarking ✓  
as die produkte van 'n individuele produsent eers gegradeer word ✓  
dan gepoel/geplaas word saam met produkte van ander lede ✓  
gepoelde produkte word as 'b eenheid behandel, gehanteer en gestoor ✓ (4)
- 5.2 sekere dienste kan gehuur ipv gekoop word ✓



- bv. dorser/stroper, ens. ✓  
 masjinerie of implemente kan gekoop word ✓  
 bv. twee of meer boere koop saam en deel ✓  
 die boer kan sy kapitaal uitbrei ✓  
 bv. deur van krediet gebruik te maak/lening ✓ (6)
- 5.3 [enige 4]
  - pryse van ander mededingende produkte ✓
  - produksiekoste ✓
  - tegnologie ✓
  - aard ✓
  - winsgrens van die produk ✓
  - stabiliteit van die produk ✓
  - tydperk/seisoen van produksie ✓ (4)
- 5.4 verskaf ruimte ✓  
 bron van alle grondstowwe ✓  
 verskaf voedsel ✓  
 bron van minerale ✓ (4)
- 5.5 los werkers / kontrak werkers ✓  
 seisoenale werkers ✓ (2)
- TOTAAL AFDELING B: 120**  
**GROOTTOTAAL: 150**