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TO: ALL STATE VETERINARY OFFICES
CENTRAL VETERINARY LABORATORY
DIRECTORATE OF ENGINEERING AND EXTENSION SERVICES (DEES-LAW ENFORCEMENT)
VETERINARY ASSOCIATION OF NAMIBIA (PRIVATE VETERINARIANS)
VETERINARY COUNCIL OF NAMIBIA

BOVINE SPONGIFORM ENCEPHALOPATHY (BSE) RISK ANALYSIS AND ON-GOING SURVEILLANCE PROGRAMME

1. Introduction:

Bovine spongiform encephalopathy has never been diagnosed in Namibia. However because of the seriousness which is attached to this disease particularly in reference to serious trade implications Namibia has a national BSE Surveillance Programme.

Namibia's national BSE Surveillance Programme consists of awareness and extension, inspection visits, sampling and laboratory testing from abattoirs and the field, control of ruminant derived protein (feed ban on feeding livestock with ruminant derived proteins), control and removal of specified risk material at abattoirs, import control and prosecutions of transgressors.

Following an OIE resolution in May 2007 countries were re-categorised based on their BSE risk status into three categories: (I) countries or regions with a negligible BSE risk, (II) countries or regions with a controlled BSE risk or (III) countries or regions with undetermined BSE risk. Namibia has been re-categorised into a country or region with undetermined BSE risk: "A country or region for which the determination of BSE status has not been concluded, or which does not meet the conditions to be fulfilled by the country or region to be classified in one of the other categories."

2. Recommendations for influencing the future BSE categorization for Namibia are as follows:

2.1 Review Namibia's BSE risk analysis

2.2 Reduce the risk in the event of accidental introduction of the BSE agent:

(a) Exclude rendering of Specified Risk Material (SRM) in the production of meat and bone meal/carcass meal and control proper marking and disposal of SRMs.
(b) Improve rendering (sterilisation) process.
(c) Improved feed controls and
(d) Feed ban on feeding livestock with ruminant derived proteins (Meat and Bone Meal/Carcass Meal/Blood Meal)

2.3 Improve surveillance by:

(a) Introducing rapid methods for BSE examination of cattle brains.
(b) Active surveillance of asymptomatic, at-risk populations, fallen stock by means of rapid screening in addition to passive surveillance of cattle showing clinical symptoms indicative of BSE.

3. **BSE Annual Surveillance Program:**

3.1 **Ruminant derived Meat and Bone Meal/Carcass Meal/Blood Meal control**

- Veterinary Officials shall visit every feedmill / manufacturer of farm feeds **in Namibia** at least 4x / year and take and analyse at least 2 samples of each type of feed claimed not to contain RMBM (ruminant derived meat and bone meal, carcass meal and/or blood meal).

- Veterinary Officials shall ensure the taking and analysing of at least one sample per annum of every type of farm feed **imported** into Namibia and declared as not containing RMBM (ruminant derived meat and bone meal, carcass meal and/or blood meal).

- Veterinary Officials shall ensure that every manufacturer / distributor of pet food containing RMBM, by way of reconciled records, proves the **authorised** usage of such RMBM (ruminant derived meat and bone meal, carcass meal and/or blood meal).

- Veterinary Officials shall institute control checks at border entry points or en-route to eliminate the importation of unregistered (illegal) farm feeds. Checks, findings and transgressions must be recorded.

- DVS shall oversee amendments in appropriate legislation to properly identify animals that have been exposed to ruminant derived protein and prevent such animals from being slaughtered at export abattoirs.

Field State Veterinarians:

- For routine surveillance in the **FMD free zone**, farm feed samples must be collected from feed troughs from each randomly selected farm to be visited by the AHTs (preferably in winter but dry season as well) and **forwarded to CVL (attention Ms. Mbulu)** for analysis. These need not to be taken in the prescribed format unless there is some suspicion of fraudulent activities. About 400 grams of feed or lick is required per sample.

- The State Veterinarian must sample each batch of imported feeds and samples **forwarded to CVL (attention Ms. Mbulu)** for analysis.

  Please note it is the minimum required number of samples per SV-district. In the event of any suspicion, samples should be taken in the prescribed manner (Circular No. V10/2001 and Fourth Annexure and Schedule A).

- During routine visits to farms, **AHT's** must observe the farm feeds used (brand names, Namibian registration, composition etc.) and mixtures in troughs. Inspect by observation, smell and touch for evidence of meat and bone meal and for other unauthorised feed ingredients. As with other issues (such as growth hormones, withdrawal times of substances etc.), the restrictions on the use of these commodities shall be communicated each time to the farmer or representative during the farm inspection.

- All inspections, samples taken, analysis, results, actions etc must be recorded and a summarised in your annual report and forwarded to DVS HQ Veterinary Public Health Division before 20 January of the subsequent year.

Abattoir Veterinarians

1. Specified Risk Material (SRM):

- Ensure that Specified Risk Materials (SRM's) are excluded from the rendering process.
- The following tissues are designated as Specified Risk Materials:

(a) **SRM in Bovine Animals:**

(i) the skull excluding the mandible and including the brain and eyes, and the spinal cord of animals aged over 12 months;

(ii) the vertebral column excluding the vertebrae of the tail, the spinous and transverse processes of the cervical, thoracic and lumbar vertebrae and the median sacral crest and wings of the sacrum, but including the dorsal root ganglia of animals aged over 24 months; and

(iii) the tonsils, the intestines from the duodenum to the rectum and the mesentery of animals of all ages.

(b) **SRM in Ovine and Caprine Animals:**

(i) the skull including the brain and eyes, the tonsils and the spinal cord of animals aged over 12 months or which have a permanent incisor erupted through the gum, and

(ii) the spleen and ileum of animals of all ages.

2. Marking and disposal of SRM:
Specified risk material shall be stained with a dye or, as appropriate, otherwise marked, immediately on removal, and disposed of in accordance with the provisions laid down in Regulation (EC) No 1774/2002, and in particular in Article 4(2) thereof:

a. Directly disposed of as waste by incineration in an approved incinerator plant;
b. Permanent marking, where technically possible with an obnoxious substance and finally disposed of as waste by burial in an approved landfill or by incineration as in (a) above.

3. Official veterinarians at abattoir <u>rendering</u> plants must:

- Demand daily updated records re: production of ruminant derived by-products (meat and bone meal/carcass meal/blood meal) at the specified parameters and despatch records to be kept and checked for compliance at least monthly. Correlate slaughter figures against MBM production and establish trends.

- Ensure that samples of by-products are collected for every day of production for microbiological analysis in compliance with export requirements.

- Authorise local consignments to bona fide users: pet food manufacturers after proof of valid registration with Law Enforcement Division of the Ministry of Agriculture, Water and Forestry (Mr. J. J. Izaks). Movement of consignments shall be under the authority of a permit issued by the abattoir state veterinarian. The abattoir SV shall keep detailed records of such permits / consignments and forward a copy of each permit to the field SV of destination

Note:
Refer to Regulation (EC) 1774/2002, Annex V, Chapter III, method 1 for the parameters for Meat and Bone Meal and Blood Meal production parameters.

3.2 <u>BSE surveillance & import control: (animals)</u>

3.2.1 <u>Passive surveillance</u>: (field)

The following three sub-populations of bovine animals have been identified for surveillance purposes:

(a) bovine animals over 24 months of age displaying behavioural or clinical signs consistent with BSE (**BSE clinical suspects**** and other neurological symptoms as defined under point 3 below);

(b) bovine animals over of age 1 year and older (give specific age) that have to undergo casualty slaughter (casualty or emergency slaughter);

(c) bovine animals over of age 1 year and older (give specific age) which are found dead or killed on farm, during transport or at an auction (fallen stock);

Clinical signs and duration of sickness must be carefully described and should not include ambiguous phrases such as “typical rabies” etc. Use the attached list of "typical" clinical signs of BSE to describe each case for each sample submission.

Note:
In the event that a State Veterinarian is suspecting Rabies or other differential diagnoses with neurological symptoms an additional sample for BSE **MUST** be sent to CVL:

- For Rabies testing the entire cerebellum and brainstem; and
- For BSE testing the brainstem (the V” shaped obex on the dorsal aspect of the caudal brainstem).

3.2.2 <u>Active surveillance: (</u>abattoirs)
The following four sub-populations of bovine animals have been identified for surveillance purposes:

(a) bovine animals over 24 months of age displaying behavioural or clinical signs consistent with BSE (clinical suspects) at antemortem inspection;

(b) bovine animals of age 1 year and older (give specific age) that are non-ambulatory, recumbent, unable to rise or to walk without assistance;

(c) bovine animals over of age 1 year and older (give specific age) sent for emergency slaughter or with abnormal observations at ante-mortem inspection (casualty or emergency slaughter);

(d) bovine animals over of age 1 year and older (give specific age) which are found dead or killed on farm, during transport or at an abattoir (fallen stock);

(e) bovine animals over of age 1 year and older (give specific age) at routine slaughter.

Samples must represent as many farms of origin as possible. Full details concerning the animals and place of origin must be provided.

3.3.2 Importation:

Animals imported into Namibia shall be imported with a Namibian import permit and branded and records kept as prescribed in circular V17/1998 and amendments. These animals may not be slaughtered at export approved abattoirs. Complete record on the movement and final fate of these animals should be maintained and kept up to date.

Dr. J.A Kamwi
CHIEF VETERINARIAN, VETERINARY PUBLIC HEALTH
***For* CHIEF VETERINARY OFFICER**

(The previous **Circular no: V8/2008** was on: Measures for the imports of products from animal origin for personal consumption into Europe.)

BSE Surveillance Instructions

PART I SURVEILLANCE

It is the responsibility of all supervisors to ensure that the BSE Surveillance is implemented and appropriate records kept and maintained.

1] PASSIVE SURVEILLANCE: FIELD STATE VETERINARY OFFICES

Forward to CVL the brainstem sample from the following three sub-populations of bovine animals (fresh or frozen; **do not place samples in formalin***):

(a) bovine animals over 24 months of age (give specific age) displaying behavioural or clinical signs consistent with BSE (****BSE clinical suspects** and other neurological symptoms as defined under point 3 below);

(b) bovine animals 1 year and older (give specific age) that have to undergo casualty slaughter (casualty or emergency slaughter);

(c) bovine animals 1 year and older (give specific age) which are found dead or killed on farm, during transport or at an auction (fallen stock);

Note:
In the event that a State Veterinarian is suspecting Rabies (irrespective of whether it is a definitive or tentative diagnosis) an additional sample for BSE **MUST** be sent to CVL:

- For Rabies testing the entire cerebellum and brainstem; and
- For BSE testing the brainstem (the V" shaped obex on the dorsal aspect of the caudal brainstem).

2] ACTIVE SURVEILLANCE: EXPORT ABATTOIRS

Forward to CVL the brainstem sample from the following five sub-populations of bovine animals (fresh or frozen; **do not place samples in formalin***):

(a) bovine animals over 24 months of age (give specific age) displaying behavioural or clinical signs consistent with BSE (****BSE clinical suspects** and other neurological symptoms as defined under point 3 below observed at ante-mortem inspection);

(b) bovine animals 1 year and older (give specific age) that are non-ambulatory, recumbent, unable to rise or to walk without assistance;

(c) bovine animals 1 year and older (give specific age) sent for emergency slaughter or with abnormal observations at ante-mortem inspection (casualty or emergency slaughter);

(d) bovine animals 1 year and older (give specific age) which are found dead or killed on farm, during transport or at an abattoir (fallen stock);

(e) bovine animals 1 year and older (give specific age) at routine slaughter.

***currently no histopathology examination is being done at CVL on brain samples for BSE diagnosis.**

i) Number of samples to be collected:

Samples must represent as many farms of origin as possible and should be spread throughout the month. Full details concerning the animals and place of origin must be provided.

ABATTOIR	NO. OF SAMPLES PER MONTH	NO. OF SAMPLES PER YEAR
Windhoek	100	1200
Okahandja	100	1200
Witvlei	20	240
Oshakati	10	120
Katima Mulilo	10	120
TOTAL	**240**	**2880**

N.B.: Due to the long distance, samples from Oshakati and Katima Mulilo abattoirs can be frozen and sent to CVL once a month (preferably by air), provided that the samples reach CVL frozen.

N.B.:
Clearly mark BSE samples as **"BSE surveillance"** on sending to CVL for testing.

ii) Specimen Collection Guide for cattle with suspected Bovine Spongiform Encephalopathy or for routine sampling (BSE):

The area for sample collection should be preferably an inedible area where there is no contact with edible product. The staff members involved in the collection of BSE samples i.e. establishment or DVS personnel are to take proper sanitary and hygienic measures during sample collection and before returning to edible areas of the establishment after brain sample collection.

1. Bovine brainstem removal through the foramen magnum (Using the disposable Biorad^{R} green spoon):

a. After the head has been separated from the body between the atlas and foramen magnum, place the head upside down on a support on a surface capable of being cleansed and disinfected after use. The frontal bone will be facing down and the foramen magnum facing the operator;

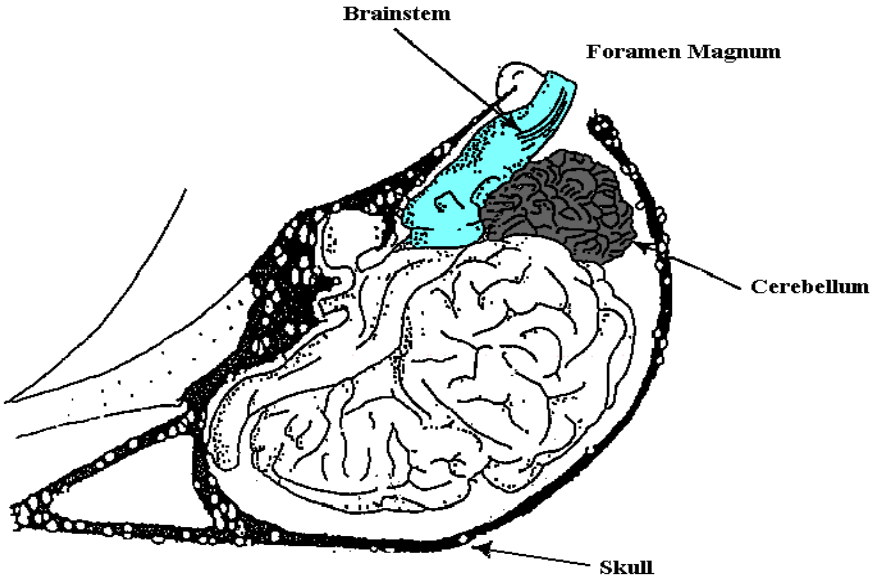


Figure 1: skull showing the caudal end of the brainstem through the foramen magnum

b. Identify the end of the caudal end of the brainstem which should be visible through the foramen magnum. If necessary, use a forceps to gently remove any blood clots which may be obscuring the brainstem and identify the dura (the tough outer membrane surrounding the brain);

c. Hold the spoon (convex surface facing downwards) and with its blade parallel to the brain stem, introduce the serrated end between the dura and the lower surface of the brainstem for about 10 cms or until resistance is felt. The dura or the end of the brainstem can be gently held with the forceps during this procedure if necessary;

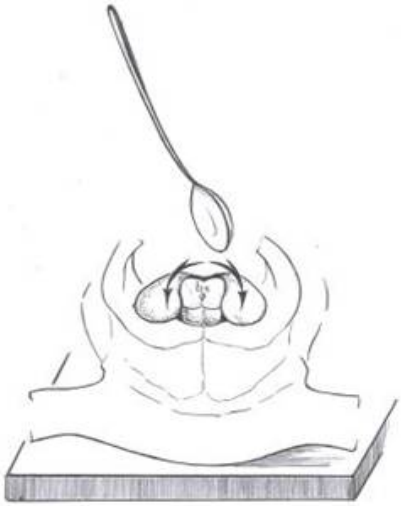


Fig. 2 The head is separated from the body and placed on a support upside down; the brainstem (bs) is separated from the bone with cutting movements left and right (curved arrows) by means of a long-handled specially designed spoon with sharp edges, inserted in the foramen magnum between bone and brain tissue.

d. Rotate the spoon approximately 45 degrees to the right and to the left to completely sever the connections between the brainstem and cerebellum. Do not use the spoon in a sawing action and keep the spoon close to the bone to avoid damaging the brain tissue;

e. Retract the spoon 2 to 3 cms and again rotate the spoon through 45 to 90 degrees to the left and to the right to completely sever the cranial nerves on either side of the brainstem;

f. Return the spoon to the midline and depress its handle until it is possible to feel the front edge touching bone. Continue applying slight downward pressure, withdraw the spoon which now holds the brainstem sample;

g. Place intact brainstem and cerebellum in a sterile container, label the container and send to CVL (fresh or frozen samples only);

h. The required sample for testing is the medulla ("V" shaped Obex-situated underneath the cerebellum);

i. Disposable plastic spoons, forceps and rubber gloves used in brainstem removal as well as the head are considered as specified risk material (SRM) and must be disposed of by incineration. They should be stored in a dedicated lidded bin awaiting disposal;

j. Stainless steel sampling tools should be adequately cleaned in a knife cleaning station to remove all residual material;

k. Clean and disinfect sampling area and clean hands

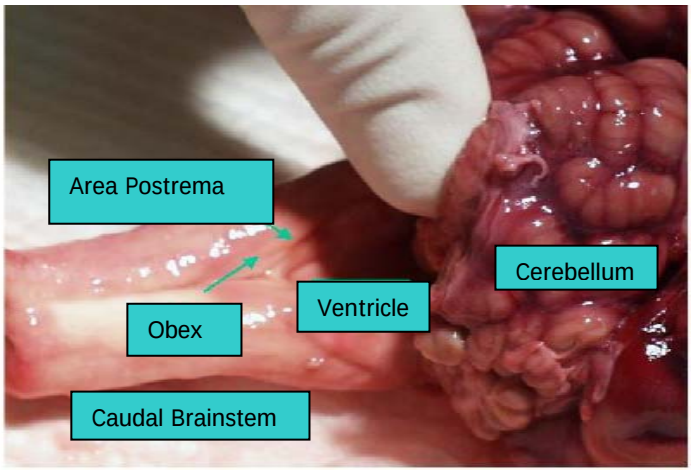


Figure 3 (a) and 3 (b): BSE specimen Collection showing the cerebellum and the brainstem.

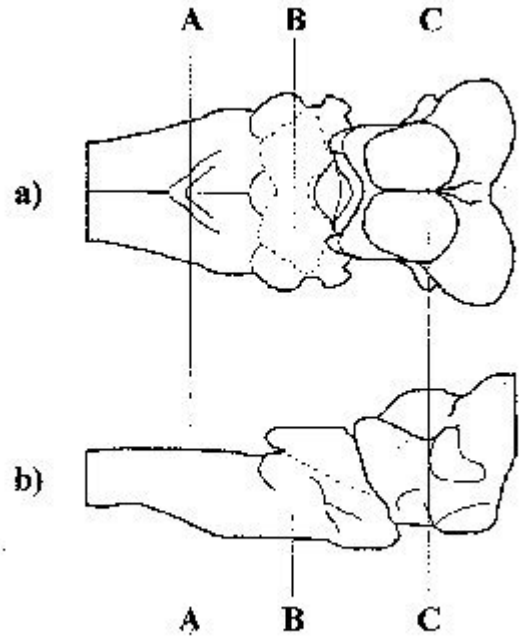
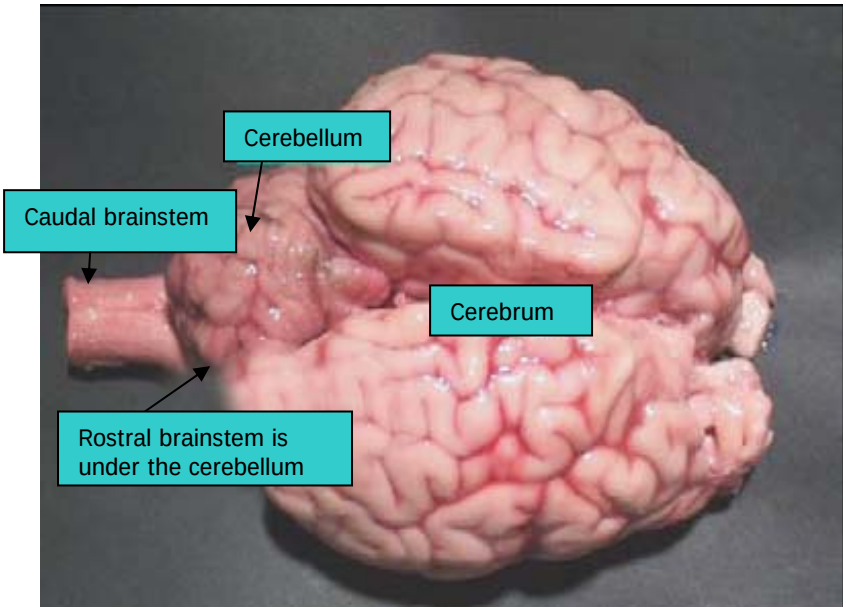


Figure 4 Brainstem after the removal of the cerebellum, from a) dorsal and b) lateral aspects. Recommended levels at which sections should be taken: A-A = medulla, at the obex; B (B = medulla through caudal cerebellar peduncles; C (C = midbrain through rostral colliculi).

2. Removal of the brainstem using the conventional method (splitting of the skull):



In the absence of the disposable Biorad green spoon from CVL kindly use the conventional method as done previously taking special precautions not to destroy the brain. Kindly use clean, sterile instruments and equipment when sampling. Follow steps (g) to (k) above.

Figure 5 Dorsal view of the brain

- preferred specimens for **BSE testing** is the brainstem (the medulla with the V-shaped Obex, the cerebellar peduncles and the rostral colliculi)
- preferred specimens for **Rabies testing** are the cerebellum, hippocampus, cortex and medulla oblongata

Note: for Rabies testing kindly contact CVL in order to ascertain whether to send samples fresh, frozen or fixed in formalin.

PART II CLINICAL SYMPTOMS: (tick off one or more observed/reported symptoms)

****BSE clinical suspect:**

1. cattle affected by illnesses that are refractory to treatment and displaying progressive behavioural changes such as:

a. excitability
b. persistent kicking when milked
c. changes in herd hierarchal status
d. hesitation at doors, gates and barriers

2. cattle displaying progressive neurological sings without signs of infectious illness

a. Unexplained aggression
b. Frenzy ("mad")
c. Tooth grinding, ears at odd angles
d. Hyperaesthesia to touch and sound
e. Hypermetria (high stepping gait ...hind legs)
f. Hind limb ataxia
g. Head shyness (and low head carriage)
h. Falling
i. Other (less important) tremors | violent kicking | loss of condition

PART III DIFFERENTIAL DIAGNOSIS FOR BSE

1. BSE must be considered in the differential diagnosis of these diseases:
   - Rabies
   - Lead poisoning
   - Plant poisoning
   - Mycotoxicoses
   - Bacterial encephalitis (e.g. Listeria)
   - Space occupying lesions
   - Acetonaemia and other metabolic disorders such as hypocalcaemia & hypomagnesaemia
   - Hepato-encepalopathy
   - Polioencephalomalacia
   - Botulism,
   - Etc.

Note:
When suspecting any of the above conditions take the appropriate samples for BSE testing as well and include a request for BSE testing on the DRF form.

2. Information accompanying the BSE samples to the laboratory:

Kindly include the following information in your laboratory request form and record this information in the appropriate registers at State Veterinary Offices:

1. **Age:** **2 permanent I** or **4 permanent I** or **6 permanent I** or **8 permanent I**

I = incisors

2. **Sex:** Male ♂ or Female ♀ or Castrated ♂

3. **Provisional diagnosis:** _____ Or N/A=abattoirs

4. **Duration of symptoms:** _____ Or Not available

5. **Origin: Farm** _____ **No.** _____ **District** _____

6. **Reference or serial number:** _____

7. **Date:** _____

PART IV GENERAL INFORMATION

1. Guide to ageing of cattle:

Cattle dentition is generally used as an indicator of age when actual birthdates are not available. Where actual birth dates are available cross check with dentition.
Eruption times and wear of the teeth are the major factors used to estimate bovine age. This guidance document will base the aging of cattle on the eruption times for the permanent incisors.

2. Tooth types and location:

There are three types of teeth found in the bovine: incisors, premolars and molars. Incisor teeth are found in the rostral portion of the mouth, but they are absent from the upper jaw. The premolars and molars (known as cheek teeth) are found in the caudal part of the mouth and are present in the upper (maxilla) and lower (mandible) jaws. The following schematic (**Figure 1**) of the bovine skull, from an older animal (all permanent teeth***** are present), demonstrates the location of the teeth.

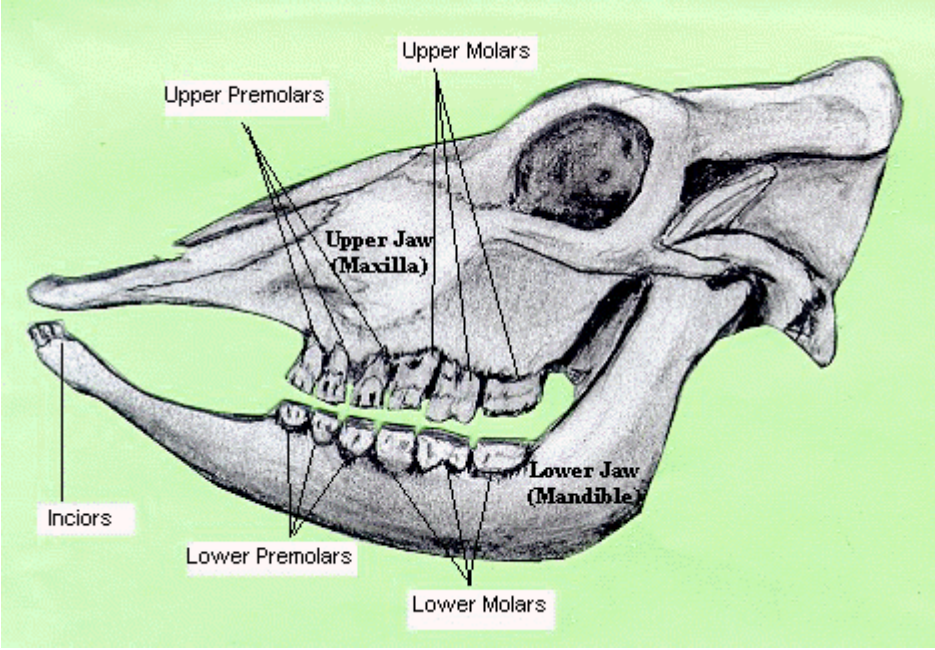


Figure 1- a skull showing cattle dentition

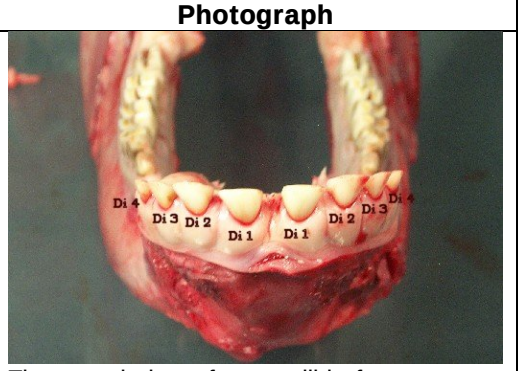
3. Deciduous (Temporary) Teeth

Calves have a total of 20 deciduous teeth. There are no deciduous molars and deciduous premolar 1 is not present. The dental formula for the deciduous teeth follows:

The dental formula for **deciduous teeth** in cattle:

- Deciduous teeth formula: 2 (Di 0/4, Dc 0/0, Dp 3/3) = 20 deciduous teeth

Table 1-Eruption times of deciduous teeth in cattle

Eruption Times of Deciduous Teeth		
Teeth	**Age at eruption**	**Photograph**
First Incisor (Di* 1)	Birth to 2 weeks of age.	
Second Incisor (Di 2)	"	
Third Incisor (Di 3)	"	
Fourth Incisor (Di 4 or C)	"	
First Cheek Tooth (Dp* 2)	Birth to a few days of age	
Second Cheek Tooth (Dp 3)	"	
Third Cheek Tooth (Dp 4)	"	
		The rostral view of a mandible from a young bovine demonstrates the location of the different deciduous incisors; they are identified – Di 1 through Di 4.
*** Di = deciduous incisor Dp = deciduous premolar**		

4. Permanent Teeth

Deciduous teeth are replaced by permanent teeth as the animal ages. Premolar 1 is not present. The dental formula for the permanent teeth of cattle follows:

The dental formula for the **permanent teeth** of cattle:

- Permanent teeth formula: 2(I 0/4, C 0/0, P 3/3, M 3/3) = 32 permanent teeth

Note: Canine teeth are absent in cattle, unless the fourth incisor (I 4) or corner incisor is considered to be a canine tooth which changes the formula slightly to:

- Permanent teeth formula: 2(I 0/3, C 0/1, P 3/3, M 3/3) = 32 permanent teeth

Table 2- Average periods of eruption times of permanent teeth in cattle

ERUPTION TIMES OF PERMANENT TEETH		
Teeth	**Age at eruption**	**Photograph**
First Incisor (I* 1) [The eruption of the first central incisor (or incisors) indicates that the animal is in the age range of 18 – 24 months]	18 – 24 months	 Photograph 8a
Second Incisor (I 2) [Cattle that have the middle (I 2) incisor (or incisors) erupted are in the 24 – 30 month age range]	24 – 30 months	 Photograph 9a
Third Incisor (I 3) [The eruption of the lateral (I 3 or second intermediate) incisor (or incisors) indicates that the animal has reached 36 months of age.]	36 months	The eruption of the lateral (I 3 or second intermediate) incisor (or incisors) indicates that the animal has reached 36 months of age.
Fourth Incisor (I 4 or C) [The eruption of the corner (I 4) incisor (or incisors) indicates that the animal has reached at least 42 months of age.]	42 – 48 months	 Photograph 11b
First Cheek Tooth (P* 2)	24 – 30 months	
Second Cheek Tooth (P 3)	18 – 30 months	
Third Cheek Tooth (P 4)	30 – 36 months	
Fifth Cheek Tooth (M 2)	12 – 18 months	
Sixth Cheek Tooth (M 3)	24 – 30 months	
* **I = Incisor P = Premolar M = Molar**		