GUIDELINES
for
Working Groups
on
TYPE CLASSIFICATION
of
CATTLE AND BUFFALOES

National Dairy Development Board
Anand, Gujarat
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1. Foreword

Traits that support high production or increase animal’s ability for longer productive life are very important to breed future cows and buffaloes. Traditionally, the farmers in India had been placing emphasis on selection of good functional characters in animals. However, over the time the emphasis on functional characteristics was diluted and more emphasis was given on appearance, colour and horn shape. This document is an effort to re-introduce body characters, which are functionally important in dairy cattle and buffaloes in Indian dairy systems.

The physical appearance of animal in terms of all body characteristics associated with productivity and fertility of animal is termed as **Type**. The traits that collectively define the type of animal are termed as **Type Traits**. Classification of animals on the basis of their type traits is termed as **Type Classification** or **Scoring**.

Current programmes for selection of animals in India primarily focus on the milk production potential of the animal, and very less on type traits. While animals are selected for milk production, one has to ensure that the body of animal is able to sustain high production. Selection solely based on milk yield may provide short term gains, but is prone to problems, which include, but not limited to, reduced feed conversion efficiency, mastitis, locomotion problems, dystocia and infertility. These problems affect life-time production performance of the animal.

Type classification for functional traits is required to be included in breed improvement programmes to facilitate selection of dams and sires to produce the next generation animals. Type classification is done on linear scales in the form of scores for standard type traits. Inclusion of these linear scores in animal evaluation aids in improving the overall efficiency of selection to maximize genetic gain per unit of time.

Type traits are usually moderate to highly heritable. Many type traits are also correlated on varying degree with production traits. They are often correlated with each other. This means selection of animals on a particular type trait also impacts production as well as concerned correlated traits. These attributes of type traits make it possible to select and improve type traits at a much rapid pace than production and fertility traits.

Type classification can also aid in decision making related to purchase, breeding, culling and marketing of animals as well as selection of mates.
2. The purpose

The system proposed here for measurement of type traits is **Linear scoring** as recommended by International Committee for Animal Recording (ICAR),

The proposed system has the following advantages:

- Scoring is based on measurements rather than opinions
- Traits are scored individually
- Scores cover a biological range
- Variation within traits is identifiable
- Degree rather than desirability is recorded

This type of data collection is very new to the implementers of Progeny Testing programmes. To sensitize the implementers, a trainers' training programme was organized at NDDB, Anand during 3-5 March 2014. During the practical training and field visits, it was realised that there is huge variation between various Indian breeds and there is a need to standardize measurement of these traits based on breed and local conditions. The linear traits considered and the scoring scales given by ICAR are based on *Bos taurus* (mainly Holstein Friesian) breeds. For effective data collection and their use in breeding indigenous cattle and buffalo breeds and their crosses, it was felt that there is a need to develop specific own scores based on variability existing in the local populations. Towards this purpose it was decided to form a working group for each breed to collect information to arrive at linear scores for the local breeds. The exercise will primarily focus on developing reference points and tools which initially would enable us to start training of personnel working in the projects.

3. Standard traits

It is proposed to include the following 20 traits to start with. While deciding the traits, care has been taken to include objective type of traits with clear definitions and measuring or scoring references. All the traits are recommended by ICAR also.

The traits are divided into five major categories as mentioned below:

a) Dairy strength:
   - Stature
   - Chest Width
   - Body depth
   - Angularity
b) Rump:
   - Rump angle
• Rump width

c) Feet and legs:
  • Rear legs set
  • Rear legs rear view
  • Foot angle

d) Udder:
  • Fore udder attachment
  • Rear udder height
  • Central ligament
  • Udder depth
  • Front teat placement
  • Teat length
  • Rear teat placement
  • Rear udder width
  • Teat thickness

e) General:
  • Body condition score
  • Muscularity (for buffaloes)

The measurements and reference scales will require adjustment to meet the ideal of a particular breed and species.

4. Parameters to be considered

In this initial phase, the basic aim is to generate Methodologies for Type Classification. It may not be of interest to identify biological extremes (best as well as worst body conformation), yet, capturing biological extremes would retrospectively be useful to elucidate issues related to type classification, if any, under particular extreme which may be addressed eventually prior to development of Standard Operating Procedures (SOPs). Furthermore, these data will also aid in developing SOPs for type classification. To bring in uniformity, following need to be taken care by working groups:

**Number of animals:** A minimum of 50 animals of assigned breed (Appendix IV) are to be scored by the working group.

**Location:** The exercise will be carried out at one of the PT project area convenient to the members of the working group (WG). All the WG members will visit the location for required period and type the required number of animals.

**Animals:** Ideally, cows/buffaloes in first lactation during the stage of lactation around peak milk production should be scored. Scoring on the selected day should be done before two hours of milking. However, if such
animals are not available in this initial phase, preference should be given to animals in first lactation between two to five months of lactation. If animals in first lactation are also not available, animals in any lactation may be scored between two to five months of lactation.

**Tools:** As majority of traits are based on measurement of dimensions, a retractable and locking measuring tape is useful tool to accurately measure the dimensions. The tool kit should also include a levelling bubble and a telescoping horizontal rod to make levelling quick and easy (Figure 1). WGs may develop similar instrument that may serve the aforementioned purpose.

Additionally, an instrument that can measure angles like foot angle and rump angle also need to be developed. WGs may work on this instrument and suggest a design for later development/multiplication.

5. **Methodologies for type classification**

Animals selected for scoring should be standing on a levelled surface. Animals should be in a comfortable normal setting, preferably along with its herd mates and owner. Restraining of animals should be avoided as far as possible as it may make the animal tense which may affect scoring of type traits that require subjective assessment (discussed in detail later). Animals suffering from any type of congenital or acquired abnormalities should not be scored. Scoring of animals immediately after calving should be avoided.

Appendix I describes, with the aid of images, methodology for measuring the type traits. The images clarify the mid-point along with biological extremes observed in Holsteins. Scores attached to each trait are on 1 – 9 range. Reference points have been highlighted to indicate clear location of the trait concerned. A short description on the measurement has also been provided.

6. **Scorecard**

A scorecard to be used for type classification has been provided in Appendix II. Information related to village name, farmer name, animal tag no./name, date of birth of animal, lactation number and date of calving should be captured preliminary to scoring. Name of the classifier must be mentioned for reference. A special note on farmer’s preference for ideal animal should also be provided.

Type traits can basically be classified into two categories with respect to their assessment *viz.* subjective assessment (for which no dimensions are possible to be measured) and objective assessment (which can be supported by dimensions). Angularity, fore udder attachment, front and rear teat placements, teat thickness, foot angle, rear legs side and rear views, body condition score and muscularity are the traits that depend on subjective
assessment while other traits depend on objective assessment. For the traits which depend on subjective assessment, scoring should be supported with the help of photographs, wherever possible. For traits which depend on objective assessment, scoring should be supported with provision of dimensions (in centimetres) in scorecard.

7. Recommendations

Recommendations on methodologies for type classification should be provided for each trait in the format provided in Appendix III. Mention of instruments used/devised should be made. New methodologies devised, if any, for any of the traits, should be mentioned. Issues experienced, if any, while assessment of any of the traits, should be mentioned. Animals of both biological extremes should be mentioned along with their tag no./name.

8. Supporting documents

Preferably, photographs for traits, especially those depending on subjective assessment, should be provided for each animal. These photographs should be clear enough to serve the purpose concerned. Videos should be provided in case a new methodology for assessing the trait has been devised or a new instrument for measuring the dimension of particular trait has been devised/used.
**Figure 1:** Retractable and locking measuring tape with leveller and telescoping rod

**Figure 2:** Sketch showing important reference points and body parts for dairy cattle
Appendix I: Methodologies for type classification

1. **Stature**

   **Reference points:** Measured from top of the spine in between hips (red spot) to the ground. Handling and alignment of measuring tape has been shown in the figures below.

   1 Short
   5 Intermediate
   9 Tall
2. Chest Width

**Reference points:** Measured from the inside surface between the top of the front legs.

- **Score 1:** Narrow
- **Score 5:** Intermediate
- **Score 9:** Wide
3. Body Depth

**Reference points:** Distance between the top of spine and bottom of barrel at last rib – the deepest point. An easy way (as shown in the figure) would be to assume an imaginary line from point of elbow (yellow line) and measure distance of deepest point of barrel from this line (red line).

Score 1: Shallow

Score 5: Intermediate

Score 9: Deep
4. **Angularity**

**Reference points:** The angle and spring of the ribs (as evident from the distance between the two adjacent ribs).

Score 1: Non-angular

Score 5: Intermediate

Score 9: Angular
5. **Rump Angle**

**Reference points:** Measured as angle of the rump from hips to pins. Two straight imaginary lines (yellow lines) may be assumed each from point of hip and uppermost point of pin (blue dots), and distance between them could be considered (red line). If pin bone is below hip bone, measure is positive; if vice versa, it is negative.

**Score 1:** High

**Score 5:** Intermediate

**Score 9:** Low
6. **Rump Width**  
**Reference points:** The distance between the most posterior point of pin bones.

**Score 1:** Narrow

**Score 5:** Intermediate

**Score 9:** Wide
7. Rear Legs Rear View

Reference points: Direction of the rear feet when viewed from the rear.

Score 1: Hocked-in

Score 5: Intermediate

Score 9: Straight
8. Rear Legs Set

**Reference points**: Angle measured at the front of the hock. An easy way would be subjective evaluation by assuming an imaginary line passing foot through hock (red line).

![Image of rear legs set with reference line](image)

- **Score 1: Straight**
- **Score 5: Intermediate**
- **Score 9: Curved**
9. Foot Angle

Reference points: Angle at the front of the rear hoof measured from the floor to the hairline at the right hoof. If visibility problems arises, subjective evaluation by an imaginary line (red line) through the hairline may be opted for.

Score 1: Low

Score 5: Intermediate

Score 9: Steep
10. Fore Udder Attachment

**Reference points:** The strength of attachment of the fore udder to the abdominal wall.

**Score 1:** Weak

**Score 5:** Intermediate

**Score 9:** Strong
11. Front Teat Placement

**Reference points:** The position of the front teat from centre of quarter as viewed from the rear.

**Score 1: Wide**

**Score 5: Intermediate**

**Score 9: Close**
12. **Teat Length**  
**Reference points:** The length of the left front teat for cattle and left rear teat for buffalo.

**Score 1:** Short  
**Score 5:** Intermediate  
**Score 9:** Long
13. Udder Depth

**Reference points:** The distance (red line) from the lowest part of the udder floor to an imaginary line through the hock (yellow line).

**Score 1: Deep**

**Score 5: Intermediate**

**Score 9: Shallow**
14. Rear Udder Height

**Reference points:** The distance between the bottom of the vulva and rear point of attachment of mammary.

Score 1: Low

Score 5: Intermediate

Score 9: High
15. Central Ligament

Reference points: The depth of cleft, measured at the base of the rear udder.

Score 1: Weak

Score 5: Intermediate

Score 9: Strong
16. Rear Teat Placement

Reference Points: The position of the rear teat from centre of quarter.

Score 1: Wide

Score 5: Intermediate

Score 9: Close
17. **Rear udder width**

**Reference points:** Width at the position where mammary gland is attached to the body at the rear.

Score 1: Narrow

Score 5: Intermediate

Score 9: Wide
18. **Teat thickness**: Teat thickness should be evaluated subjectively at the middle of the left fore teat in cattle and left rear teat in buffalo.

19. **Muscularity**
This trait should apply only to buffaloes. The traits which should be taken into account along with their graphical representation are given below. A confounded score (not individual scores) based on observation of below given traits has to be given which can only be arrived at after examination of sufficient number of animals.

**Shoulder width**

![Shoulder width images]

**Loin width**

![Loin width images]

**Rump length**

![Rump length images]
20. **Body Condition score**

Body condition scoring is concerned with two specific areas for assessment of fat covers. One is the loin area (between hip bone and last rib) which consists spinous and transverse processes of lumbar vertebrae and the other area is tail head and pin bones (shown in figure below).

Score Description

1. **Very thin (Emaciated):** Animal markedly emaciated; bone structure easily seen over body; little muscle present; animal weak, lethargic.

2. **Thin:** Animal emaciated; individual spinous processes, ribs, hooks (tuber coxae), pins (tuber ischii), shoulder blades and spine all prominent, sharply defined; some muscle development; neck thin; prominent withers; shoulders sharply angular. Area around the tail-head completely sunken.

3. **Less thin:** Vertebral column prominent and individual spinous processes can be felt; little fat, but supraspinous muscle over spinous processes apparent; ribs, pins, (tuber ischii) and hooks (tuber coxae) prominent; loin area and rump concave; little muscle or fat covering over withers and shoulders.

4. **Less than moderate:** Vertebral column prominent and individual spinous processes can be felt; little fat, but supraspinous muscle over spinous processes apparent; ribs, pins, (tuber ischii) and hooks (tuber coxae) prominent; loin area and rump concave; little muscle or fat covering over withers and shoulders.

5. **Moderate:** Supraspinous muscles developed and readily apparent; vertebral column can be felt; hooks (tuber coxae) rounded; rump rounded, convex; pins (tuber ischii) not visible; some fat can be felt in shoulder area region and at base of neck; can feel ribs, but not visible.

6. **More than moderate:** Cannot feel spinous processes easily; back becoming flat well covered; rump convex and well muscled; some fat can be felt on neck, base of neck and shoulder area; neck filled into shoulder; hooks (tuber coxae) just visible.
7. **Less fat:** Back flat; cannot feel spinous processes; hooks (tuber coxae) just visible; fat on neck and shoulder area beginning to expand over ribs; flanks filling, neck thickening.

8. **Fat:** Animal appears well covered with body rounded with fat and bones not discernible; flanks filled, broad back.

9. **Very fat (obese):** Bones buried in fat; back broad or flat, in some cases crease along the backbone; large accumulations of fat on neck, over shoulder area and ribs; flank filled with fat.
### Type Evaluation Form

<table>
<thead>
<tr>
<th>Section</th>
<th>Trait</th>
<th>Score</th>
<th>Measure (cm)</th>
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<tbody>
<tr>
<td><strong>Stature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>Tall</td>
</tr>
<tr>
<td></td>
<td>Chest Width</td>
<td>Narrow</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Body Depth</td>
<td>Shallow</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Angularity</td>
<td>Non-angular</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td><strong>Rump</strong></td>
<td>Rump Angle</td>
<td>High</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Rump Width</td>
<td>Narrow</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td><strong>Feet and Leg</strong></td>
<td>Rear Legs Set</td>
<td>Straight</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Rear Legs Rear View</td>
<td>Hocked-in</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Foot Angle</td>
<td>Low</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td><strong>Udder</strong></td>
<td>Fore Udder Attachment</td>
<td>Weak</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Rear Udder Height</td>
<td>Low</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Central Ligament</td>
<td>Weak</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Udder Depth</td>
<td>Deep</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Front Teat Placement</td>
<td>Wide</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Teat Length</td>
<td>Short</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Rear Teat Placement</td>
<td>Wide</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Rear udder width</td>
<td>Narrow</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Teat thickness</td>
<td>Thin</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>Body condition score</td>
<td>Thin</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>Muscularity</td>
<td>Poor</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>
Farmer's preference for ideal cow/buffalo

- Strength:

- Rump:

- Udder:

- Feet and Legs:

- Overall:
Appendix III: Format for providing recommendations

1. Instruments used/devised for scoring:

2. Tag numbers of top 5 and worst 5 animals scored:

3. Issues faced during scoring of animals mentioning traits concerned:

4. List of supporting documents provided:
Appendix IV: Working groups for different breeds

<table>
<thead>
<tr>
<th>Breed</th>
<th>Members of working group</th>
</tr>
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<tbody>
<tr>
<td>HF</td>
<td><strong>Dr. Nageswara Reddy</strong> (KMF), Dr. S. Raja (NDDB), and One officer from KMF</td>
</tr>
<tr>
<td>HFCB</td>
<td><strong>Dr. R. L. Bhagat</strong> (BAIF), Dr. C. T. Patel (SAG), Dr. Sajeev Kumar (KLDB), Dr. Vishal Sharma (ULDB) and Dr. Swapnil Gajjar (NDDB)</td>
</tr>
<tr>
<td>JCB</td>
<td><strong>Dr. Suresh Kumar</strong> (TCMPF), Dr. Shaik Assef (APLDA) and Dr. A. Sudhakar (NDDB)</td>
</tr>
<tr>
<td>Murrah</td>
<td><strong>Dr. Amit Khurana</strong> (PLDB), Dr. B. S. Soni (ABC), Dr. Sujit Saha (NDDB), Dr. N. K. Khurana (HLDB) and Dr. Nilesh Nayee (NDDB)</td>
</tr>
<tr>
<td>Mehsana</td>
<td><strong>Dr. M. N. Prajapati</strong> (Mehsana Union), Dr. Vinod L. Judal (Banas Union), Dr. G. Kishore (NDDB) and Dr. Parag R. Pandya (NDDB)</td>
</tr>
</tbody>
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Project Officers whose name is mentioned in bold have been identified as team leader for concerned group and will coordinate the working group activities. The working groups should submit their report before **30th June 2014**.