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ABSTRACTS OF THE SCIENTIFIC PAPERS PRESENTED DURING THE DAIRY CONGRESSES EXTRACTED FROM THE THESIS
It is generally believed that feeding good green fodder in excess of requirement has a beneficial effect on milk production.

A cross-breeding project has been in progress at the National Dairy Research Institute, Karnal, with the specific object of producing high yielding cows adapted to the climatic extremes of Northern India. The details of the project have been given elsewhere.

Initially the animals which were due to calve for the 3rd or 4th time were grouped into four categories, two of cross-breeds and two of pure-breeds (Sahiwal and Red Sindhis), each group being otherwise comparable. One group each of cross-breeds and pure-breeds were given good quality green fodder ad lib while the other two groups were given the same fodder as animals in the main herd. All animals were given concentrates according to milk production. Observations on fodder consumption, body weights, physiological reactions (temperature, respiration and pulse) and milk production were carried out from February to July, 1969.

It was observed that while body weights increased from 293 to 344, and 391 to 414 kg in the ad lib fed pure-breeds and cross-breeds, corresponding increases were from 314 to 325 kg and 394 to 409 kg for control groups. Fodder consumption varied from 2 to 2\% of body weight, on dry matter basis,
for standard-fed animals and 3 to 5% for ad lib fed animals. However, daily milk production averaged 8.85 kg and 16.12 kg under ad lib feeding and 9.33 kg and 18.84 kg under standard feeding for pure-breed and cross-breed animals, respectively. More cases of disease (tympanitis, mastitis, diarrhoea and retention of placentas) were observed for ad lib fed cross-breeds and standard-fed pure-bred animals.

In July 1969 the animals were re-grouped for individual feeding and additional shelter (approximately double the protection from direct solar radiation) in 2x 2x 2 factorial design. The animals have been tied-up except for watering and milking three times a day.

Observations made so far indicate that there is only marginal difference in performance between the different treatments, although cross-breeds have shown symptoms of respiratory distress during extreme heat of day.

The experiments are in progress and when completed, detailed reports will be communicated to the Indian Journal of Dairy Science.

References:

ABSTRACT No.1

PREDICTION OF SURFACE AREA ON THE BASIS OF ALLIED CHARACTERS


Surface area is an important index in the thermodynamic mechanisms of the body of the animal and its environments. It is indispensable as the metabolic rates are expressed in K cal per unit surface area. While it is difficult to ascertain the surface area of an animal under field conditions, some possible approaches can be exploited. It is, therefore, necessary to predict the surface area on the basis of allied characters such as body weight, body length, height and heart girth.

An attempt was made to obtain the prediction equations to predict the surface area on the basis of the above-mentioned characters for straightbred, Brown Swiss cross-bred cows maintained at the National Dairy Research Institute herd, Karnal. The prediction equations were found to be:

Cross-bred: \( Y = -4.720043 + 0.011116x_1 + 0.002391x_2 + 0.025936x_3 + 0.003948x_4 \)

\( R^2 = 0.8922 \)

Straightbred: \( Y = -2533899 + 0.000301x_1 + 0.009930x_2 + 0.022511x_4 \)

\( R^2 = 0.6406 \)

Where

- \( Y \) = Surface area in \( \text{m}^2 \)
- \( x_1, x_2, x_3 \) and \( x_4 \) = Body weight in kg, body length, height and heart girth in cm, respectively.

These prediction equations were found to explain 89.2% and 64.1% of the variations on the surface area of the cross-
bred and straightbred cows. The multiple correlations being 0.9445 for cross-breds and 0.8004 for straightbreds. A knowledge of the body weight, body length, heart girth and height, therefore, provides sufficient information for assuming the surface area of adult cross-bred and straightbred cows.

Apart from assessing the surface area from height, length and heart girth, an attempt has been made to measure the surface area by means of surface integrator. The relation between surface area and body weight was found to be highly significant. Prediction equations were found to be, $Y = 0.2483(W)^{0.464}$ and $Y = 0.3414(W)^{0.406}$ for the crossbreds and straightbreds, respectively.

*Paper presented by the Sr. author during the 8th All India Dairy Industry Conference held at Trivandrum. February 1971.
Reprinted from the proceedings of the 8th All India Dairy Industry Conference

ABSTRACT No.2

COMPARATIVE PRODUCTION PERFORMANCE OF STRAIGHTBRED AND THEIR CROSSES UNDER HIGH ROUGHAGE AND LOW CONCENTRATE FEEDING

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National Dairy Research Institute,
Karnal (Haryana), India.

Considering the importance of feeding economics of nutritious rations for efficient productive performance, a series of investigations has been started at National Dairy Research Institute, Karnal. In the present study, an attempt has been made to assess the efficiency of milk production of crossbred and straightbred cows kept on high roughage low concentrate diets. Cows selected for these studies were in the 3rd lactation. Green fodder was fed ad lib to all the animals. Concentrates offered were just sufficient to meet their DCP requirements of maintenance and milk production.

Records of body weights, feed consumption and milk production were maintained.

Average body weights ranged from 295 to 434 kg and 354 to 456 kg for straightbred and crossbred cows. The average DM consumption per kg body weight per day in straightbred was 0.0248 ± 0.0148 kg and in crossbred was 0.0395 ± 0.0019 kg. The TNF values per kg body weight per day were 70.8 ± 4.49 K cal and 104.8 ± 9.73 K cal for straightbred and crossbreds, respectively. On the other hand, the FCM productions were 19.04 ± 1.59 kg for straightbred and 30.07 ± 2.32 for crossbreds.

The efficiency of milk production as estimated from the input-output relationship was worked out to be 30.12%
in crossbreds and 26.63 in straightbreds. The 30.12% efficiency is nearer to the theoretical 35% maximal efficiency as stated by Brody (1945). This difference between breeds was not statistically significant. From these investigations it could, however, be concluded that the efficiency of crossbred cattle was maximal under high roughage feeding regime.

*Paper presented by the Sr. author during the 8th Dairy Industry Conference held in Trivandrum, February 1971.
With a view of investigating the effects of management and climatic environments on the breeding efficiencies of straightbred cattle and their crosses a study has been conducted. Scientific investigations in this country and the world over proved that climatic variations and other factors taken individually or collectively affect the breeding efficiencies of cattle. The parameters used were (i) number of inseminations per conception; (ii) number of days from calving to first insemination; and (iii) service period.

Analysis of variance showed that none of the factors studied significantly influenced the number of inseminations for successful conception. The crossbreds, however, were observed to require 1.4 inseminations on the average as compared to 3.0 for the straightbreds. The shelter (standard vs. modified, giving shade approximately double the standard) or the types of feeding (ad lib vs. standard) had no considerable influence on the number of days from calving to first successful insemination. The two breeds showed significant difference among themselves since crossbreds conceived 12 days earlier than the straightbreds (significant at 1% level of probability). As regards the number of days from calving to first insemination the crossbreds came into heat 50 days earlier than straightbreds (significant at 1% level of probability).
The interaction between the shelters and breeds showed that crossbred animals could conceive 23 days earlier than the straightbreds in favour of the modified shelter (significant at 1% level of probability). However, either the shelter or feeding or other interactions effects were not statistically significant.

*Paper presented by the Sr. author during the 8th Dairy Industry Conference held in Trivandrum, February 1971.
TABLES

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Paper No. 1.

Predictions of surface area on the basis of allied characters

TABLE A

COMPARATIVE AVERAGE VALUES OF STRAIGHTBRED CATTLE AND THEIR CROSSES

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Straightbred</th>
<th>Crossbred</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of animals</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Body weights (kg)</td>
<td>358.0 ± 8.7</td>
<td>397.0 ± 8.3</td>
</tr>
<tr>
<td>Surface area (m²)</td>
<td>3.69 ± 0.05</td>
<td>4.00 ± 0.06</td>
</tr>
<tr>
<td>Body length (cm)</td>
<td>137.3 ± 1.6</td>
<td>148.5 ± 1.1</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>122.5 ± 1.5</td>
<td>126.1 ± 0.7</td>
</tr>
<tr>
<td>Heart girth (cm)</td>
<td>168.8 ± 1.3</td>
<td>172.7 ± 1.5</td>
</tr>
</tbody>
</table>
**TABLE B**

**PREDICTION EQUATIONS FOR SURFACE AREA**

1. (1) **Crossbred animals**
   \[ Y = -4.720043 + 0.011116x_1 + 0.002391x_2 + 0.025936x_3 + 0.003948x_4 \]
   \[ R^2 = 0.8922 \]

2. (2) **Straightbred animals**
   \[ Y = -2.553899 + 0.000301x_1 + 0.009930x_2 + 0.022511x_4 \]
   \[ R^2 = 0.6406 \]

**II (1) Crossbred animals**

1. \[ Y = 0.2483x_1 + 0.4642 \]
   \[ R^2 = 0.2598 \]

2. \[ Y = 0.3414x_1 + 0.4060 \]
   \[ R^2 = 0.5185 \]

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**Paper No. 2.**

Comparative production performance of straightbred and their crosses under high roughage and low concentrate feeding.

**TABLE A**

**COMPARATIVE PRODUCTION EFFICIENCY OF STRAIGHTBRED AND THEIR CROSSES**

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Straightbred</th>
<th>Crossbred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of animals</strong></td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td><strong>Average body weight (kg)</strong></td>
<td>358 ± 13.0</td>
<td>400 ± 10.2</td>
</tr>
<tr>
<td><strong>Daily average DM intake (kg)</strong></td>
<td>8.86 ± 0.66</td>
<td>15.69 ± 0.51</td>
</tr>
<tr>
<td>Daily average TDN intake (M cal)</td>
<td>2504.0 ± 413</td>
<td>3884.0 ± 470</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Daily average FCM production (M cal)</td>
<td>675.0 ± 55.6</td>
<td>1192.0 ± 78.2</td>
</tr>
<tr>
<td>Production efficiency</td>
<td>26.63 ± 1.69</td>
<td>30.12 ± 2.06</td>
</tr>
</tbody>
</table>

**TABLE B**

COMPARATIVE DAILY CONSUMPTION AND PRODUCTION PER KG BODY WEIGHT

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Straightbred</th>
<th>Crossbred</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of animals</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>DM</td>
<td>0.0248 ± 0.0015</td>
<td>0.0395 ± 0.0020</td>
</tr>
<tr>
<td>TDN (K cal)</td>
<td>70.8 ± 4.5</td>
<td>104.8 ± 9.7</td>
</tr>
<tr>
<td>FCM (K cal)</td>
<td>19.04 ± 1.59</td>
<td>30.07 ± 2.31</td>
</tr>
</tbody>
</table>
Paper No. 3.

Comparative reproductive efficiencies of straight-bred cattle and their crosses (BS & BB) under different management and meteo-climatic conditions

**TABLE A**

**ATTRIBUTES IN DETERMINING REPRODUCTIVE EFFICIENCIES**

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Breed</th>
<th>Shelter</th>
<th>Feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Straight-bred</td>
<td>Standard</td>
<td>Modified</td>
</tr>
<tr>
<td>No. of inseminations for successful conception</td>
<td>3.0</td>
<td>1.4</td>
<td>2.15</td>
</tr>
<tr>
<td>No. of days from calving to first insemination</td>
<td>104.35</td>
<td>54.50</td>
<td>73.40</td>
</tr>
<tr>
<td>No. of days from calving to successful insemination</td>
<td>192.70</td>
<td>68.35</td>
<td>130.60</td>
</tr>
</tbody>
</table>