Increasing productivity in dairy cattle and buffaloes through improved genetics

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PCC National Headquarters
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Senior local born AI bull

<table>
<thead>
<tr>
<th>No. of daughters:</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of herds</td>
<td>7</td>
</tr>
<tr>
<td>Trait</td>
<td></td>
</tr>
<tr>
<td>Milk yield</td>
<td>569</td>
</tr>
<tr>
<td>Fat yield</td>
<td>30</td>
</tr>
<tr>
<td>Protein yield</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trait</th>
<th>EBV</th>
<th>Acc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk yield</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Fat yield</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>Protein yield</td>
<td>0.73</td>
<td></td>
</tr>
</tbody>
</table>

Dam's milk prod'n

<table>
<thead>
<tr>
<th>Parity</th>
<th>YY</th>
<th>Milk Yield, kg</th>
<th>DIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>First parity</td>
<td>2000</td>
<td>1,395.9</td>
<td>305</td>
</tr>
<tr>
<td>Second parity</td>
<td>2001</td>
<td>1,891.9</td>
<td>302</td>
</tr>
<tr>
<td>Third parity</td>
<td>2003</td>
<td>2,078.2</td>
<td>301</td>
</tr>
<tr>
<td>Fourth parity</td>
<td>2005</td>
<td>2,382.6</td>
<td>305</td>
</tr>
</tbody>
</table>
Younger local born AI bull

Parity YY MY, kg DIM
First parity 2003 2,367.5 463
Second parity 2005 2,606.5 282
Third parity 2006 2,400.0 302
Fourth parity 2007 2,193.0 305
Fifth parity 2008 3,038.8 305

Breeding Program for purebred riverine buffaloes

Evaluation of Dam and Sire performance
Ranking of Offspring
Selection of Offspring
Female
Replacement
Loan/sell
Cull
Male
Candidate Bull for Semen Production
Bull for natural mating
Loan/sell
Cull

Breeding (Natural mating/AI)
Production of Offspring
Heifer calves for rearing
Bull calves for rearing
Evaluation of daughters' performance
Senior AI Bull

Cows from coops
Waiting bulls
How do we go about increasing milk production through improved genetics?

Organized breeding program

- Selection/Culling
  - Among purebred animals
  - Applicable also among crossbred animals

- Crossbreeding
  - Combine the advantages of parental breeds for breed development
Selection of replacement animals based on performance

- Combine culling/selection to steadily increase the average of the herd
- Traits of economic importance can be passed on by the parents to their offspring
  - This is a permanent change in the population that is exploited in animal breeding
- In a practical sense
  "As long as you select replacement animals from your best milking cows, you are going to make genetic progress"

Selection of replacement animals, some pointers....

- Determine your herd’s average production parameters
  - This will be a good reference to determine the superiority of a good cow from its contemporaries

- Do not compare “apples” with “oranges” - compare cows with their contemporaries
  - First parity cows’ milk production are on the average, lower than 2nd or more parities
    - Compare a first parity cow’s production with the average production of first parity cows in the herd
  - The same applies to different parities but take note:
    - Maximum production is normally on the 2nd and 3rd parity
    - On the average, 5th parity average is almost similar to first parity average
Selection of replacement animals, some pointers....

- Cows calving in summer/dry season on the average, have higher milk production than cows calving in rainy season.

- Proper rearing of heifer calves is very important in order that the future milk production of the selected female is expressed to the fullest of its genetic potential.
  - The good genes can still be passed on to its offspring and be expressed in that generation provided that optimum rearing condition is provided.

- Practice culling together with selection.

Recording individual reproduction and milk production performance is important

**To do list**

- Unified unique ID system - uniform character length
- Define breeding objectives
- Define structure of breeding program
  - Recorded herds
  - AI station and sire assignment
- Enrollment of herds
- Performance recording - monthly milk test days
- Central data processing
  - Analysis of herd and individual cow performance
  - Reporting system
Monthly milk sampling: When to collect?

“Sacrifice day”

► Once a month e.g. every 1\textsuperscript{st} of the month
  ► Schedule is entirely up to you
  ► May range between 25 - 35 days between intervals
  ► Avoid missing a test day

► Collect AM and PM sample from each cow on the same day
  ► Interval between milking: 10 - 12 hrs

► First milk sample should be:
  ► within 45 days of calving
  ► Should not be earlier than five days after calving
  ► Always indicate date of calving

Monthly milk sampling: How long to collect?

► For milk performance recording, we only need 10 - 11 milk samples in each lactation. These should be the first 10 - 11
  ► Always indicate date of dry off in the form provided
  ► Always indicate any condition that might affect the cow’s record on the remarks column provided
  ► There is also a separate cow treatment form
Crossbreeding programs

- The improvement in genetic potential of crossbreds is heavily dependent on the parental purebreds.

<table>
<thead>
<tr>
<th>Observed phenotype on crossbred 5.25 kg milk</th>
<th>Observed phenotype on crossbred 7.08 kg milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Heterosis 0.25 kg</td>
<td>5% Heterosis 0.33 kg</td>
</tr>
<tr>
<td>Parental average 5 kg</td>
<td>Selection and improvement of parental breeds</td>
</tr>
</tbody>
</table>

An over-simplified representation of the parents’ genetic potential to the expression of a trait in their crossbred offspring.

- Holstein bulls are selected for higher milk production, but.....
  - Genetics potential can not be expressed fully due to poor adaptation to tropical climate
  - High percentage of Holstein/Jersey/temperate cattle breed blood in crossbreds is not recommended.

Develop a tropical dairy cattle breed

- Select replacement heifers from good milking/productive cows that were evaluated under Philippine condition
  - Cow lines that have good adaptability will increase in number

- Utilize 2- or 3-breed rotational crossbreeding program to maximize heterosis and keep the percentage of Holstein blood from increasing to >75% can be a strategy
  - 2-breed rotational cross is easier to implement
  - 2nd breed should be tropical dairy breed

- Girolando is an example of a dairy breed for a tropical country that was developed using Gyr and Holstein blood
  - Gyr blood - tropical dairy cattle breed
Thank you