Longevity and Reasons of Culling of German Holstein–Friesian under Libyan Conditions

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Objectives of study

- Factors affecting Longevity traits and milk yield.

- Estimates of genetic parameters.

- Investigate reasons of culling
Materials and Methods

- Data:
  - 2196 first lactation records
  - 95 sires

- Foundation herd imported from Germany in 1986
- Imported semen for AI

- Dutch company managed from 1986–1991
- 3x milking

- At Ghot Alsultan 50 Km south east Benghazi
Traits:

- True Herd Life
- Productive Live
- Number of latation
- 305 day milk production
Model:

\[ Y_{ijklmno} = \mu + O_i + G_j + A_k + L_l + E_m + M_n + S_o + b_{(DO)} + E_{ijklmno} \]

\( Y_{ijklmno} \) = Traits studied effect (True herd life, productive life and number of lactation),
\( \mu \) = Overall mean,
\( O_i \) = the fixed effect of the \( i^{th} \) origin of sire,
\( G_j \) = the fixed effect of the \( j^{th} \) Generation of cow,
\( A_k \) = the fixed effect of the \( k^{th} \) age at first calving cow,
\( L_l \) = the fixed effect of the \( l^{th} \) level of milk production,
\( E_m \) = the fixed effect of the \( m^{th} \) year of calving,
\( M_n \) = the fixed effect of the \( n^{th} \) month of calving,
\( b_{(DO)} \) = simple regression coefficient of the studied trait on days open,
\( S_o \) = the random effect of the \( n^{th} \) sire, and
\( E_{ijklmno} \) = the residual effect.
Level of production

- Low: less than 7000 liter
- Medium: 7000–8000 liter
- High: greater than 8000 liter

Origin of Sires:
- North America (USA & Canada)
- Germany
- Libya (locally born)
Results

- All factors included in the model were had significant effect \((P>0.05)\) on longevity traits and milk yield of Holstein Friesian cows.

- Exception: the effect of age at first calving and month of calving on true herd life.
## Level of production

<table>
<thead>
<tr>
<th>Level of milk production</th>
<th>N</th>
<th>True herd life (days)</th>
<th>Productive life (days)</th>
<th>Number of lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>525</td>
<td>2004.07 ± 760.11&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1162.55 ± 759.98&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.08 ± 1.76&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Medium</td>
<td>1402</td>
<td>2237.72 ± 817.16&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1383.56 ± 827.06&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.54 ± 1.91&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>High</td>
<td>269</td>
<td>2239.76 ± 899.83&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1395.46 ± 919.77&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.59 ± 2.03&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
## Origin of Sire

<table>
<thead>
<tr>
<th>Origin of Sire</th>
<th>True herd Life (days)</th>
<th>Productive Life (days)</th>
<th>Number of Lactation</th>
<th>Milk yield 305 days (liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North American</td>
<td>2374 ± 747&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1538 ± 735&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.10 ± 1.72&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8082±1204&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>German</td>
<td>2211 ± 848&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1364±857&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.51 ± 1.96&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7888±1086&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Libyan</td>
<td>2031 ± 683&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1166± 690&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.02 ± 1.60&lt;sup&gt;c&lt;/sup&gt;</td>
<td>7435±946&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
Generations

Days

Generation

True herd life
Productive life
Number of lactation
Generations

Milk yield 305 days
Age at first calving

![Graph showing the relationship between age at first calving and days, with lines representing true herd life, productive life, and number of lactations.](image-url)
Year of calving
Month of calving

![Graph showing the number of days and number of lactation for different months, along with categories for True herd life, Productive Life, and Lactation.](image)
# Genetic Parameters

<table>
<thead>
<tr>
<th>Traits</th>
<th>True herd Life</th>
<th>Productive life</th>
<th>Number of lactation</th>
<th>Milk yield 305 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>True herd life</td>
<td>0.064</td>
<td>0.993</td>
<td>0.941</td>
<td>0.126</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productive life</td>
<td>0.995</td>
<td>0.072</td>
<td>0.942</td>
<td>0.125</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of lactation</td>
<td>0.971</td>
<td>0.974</td>
<td>0.056</td>
<td>0.117</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk yield 305 day</td>
<td>0.350</td>
<td>0.370</td>
<td>0.42</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reasons of culling

- Death: 13%
- Low fertility: 37%
- Accidental defects: 18%
- Mastitis: 13%
- Digestive disturbance: 9%
- Low milk production: 5%
- Diseases: 3%
- Aged: 2%
Level of milk production was related with longevity traits but no differences between medium and high producing cows.

NA sires had daughters with higher longevity traits than German and Libyan sires. This might be due to heterosis.

Longevity traits will respond slowly to direct selection but will respond moderately indirectly through selection for high milk yield.

Longevity traits were genetically highly correlated.

Cows could be bred at age of 15 to 16 month to calve at age 25 to 27 month which have better longevity.
Heterosis increase longevity at early generation while inbreeding decrease it at late generation.

Lower fertility, accidental defects, mastitis and digestive disturbance where major reasons for cow to leave the herd.
Thanks