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Evaluation of lifetime economic returns of sow by parity at culling in commercial breeding herds
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Meiji University, Kawasaki, Japan

Introduction and Objectives
Sow longevity has a major effect on profitability in commercial breeding herds (Plà et al., 2003). There is large country-to-country variation in production values, market prices, feed cost, and other expenses. We need to determine its own financial assumptions and standards in order to assess economic returns for commercial herds. The objective of the present study was to evaluate the number of parities that a sow must remain in the herd for economic returns over the lifetime of sows (lifetime net income) to become positive in typical farrow-to-finish operations in Japan. A further objective was to use sensitivity analysis to determine how any changes in feed price or the price for marketed pigs would influence economic returns in Japanese commercial swine herds.

Material and Methods
The reproductive data were collected from records of 53,996 sows born between 2001 and 2004 in 101 commercial herds. The economic models for lifetime net income by parity were constructed using reproductive data and economic assumptions. The economic assumptions were based on data obtained from previous studies and multiple producer groups in Japan. Lifetime net income in each parity was calculated as the sum of net income in each litter, including salvaged values for sows, minus gilt costs. The net income in each litter was calculated as the revenue obtained by sales of marketed pigs from each litter minus production costs. The costs included feed costs for growing pigs and sows, depreciations for replacement gilts, and the other costs for facility, breeding, veterinary treatment and vaccines, transportation and slaughter fees, utility and labor. All values and prices referred to in the present study are in U.S. dollars, with an assumed exchange rate of one U.S. dollar to 100 Japanese yen. Sensitivity analysis was performed to investigate how changes in feed price and the price for marketed pigs would affect lifetime net income.

Results and Discussion
The lifetime net income increased from $-42.4 to $3,666.0 as the culling parity increased from 1 to 8, with positive lifetime net income values being reached at parity 2 (Table). The net income per litter increased from $376.3 in parity 1 to a peak of $596.2 in parity 5, but then fell again to $497.0 by parity 8. Sensitivity analysis showed that lifetime net income was negative in all parity groups if the feed price increased from $0.40 per kg to $0.55 per kg. If the price for marketed pigs declined to $3.75 per kg or lower, the lifetime net income in parity 2 and 3 was negative.

In conclusion, increased sow longevity results in increased lifetime net income of sows in commercial herds. High feed prices for growing pigs and sows are highly related to a decline in lifetime net income of sows.

Table. Lifetime net income ($) by parity (PY)

<table>
<thead>
<tr>
<th>PY</th>
<th>Revenue</th>
<th>Cost</th>
<th>Salvaged sow price</th>
<th>Lifetime net income</th>
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<tbody>
<tr>
<td>0</td>
<td>0.0</td>
<td>600.0</td>
<td>163.8</td>
<td>(▲436.2)</td>
</tr>
<tr>
<td>1</td>
<td>2622.1</td>
<td>2245.9</td>
<td>181.4</td>
<td>(▲42.4)</td>
</tr>
<tr>
<td>2</td>
<td>2784.3</td>
<td>2344.9</td>
<td>204.8</td>
<td>420.5</td>
</tr>
<tr>
<td>3</td>
<td>2919.5</td>
<td>2429.3</td>
<td>222.3</td>
<td>928.2</td>
</tr>
<tr>
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<td>2946.5</td>
<td>2446.0</td>
<td>239.9</td>
<td>1446.3</td>
</tr>
<tr>
<td>5</td>
<td>2919.5</td>
<td>2323.3</td>
<td>251.6</td>
<td>2054.2</td>
</tr>
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<td>2865.4</td>
<td>2288.0</td>
<td>251.6</td>
<td>2631.7</td>
</tr>
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<td>251.6</td>
<td>3169.1</td>
</tr>
<tr>
<td>8</td>
<td>2649.2</td>
<td>2152.2</td>
<td>251.6</td>
<td>3666.0</td>
</tr>
</tbody>
</table>

All values in the Table indicates U.S. dollar. One U.S. dollar was assumed to be equivalent to 100 Japanese yen.
▲Values enclosed in parentheses represent negative net income.

References