The following table presents the Temperature Humidity Index, calculated from temperature (in degrees Fahrenheit or Centigrade) and relative humidity (%), highlighting its potential effects on cow heat stress and hence performance.

<table>
<thead>
<tr>
<th>Temperature (°F)</th>
<th>Relative Humidity (%):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A  &lt;72</td>
</tr>
<tr>
<td></td>
<td>B  72–78</td>
</tr>
<tr>
<td></td>
<td>C  78–89</td>
</tr>
<tr>
<td></td>
<td>D  89–98</td>
</tr>
<tr>
<td></td>
<td>E  &gt;98</td>
</tr>
</tbody>
</table>

Five comfort zones
for milking cows

A  <72  No stress
B  72–78  Mild stress
C  78–89  Severe stress
D  89–98  Very severe stress
E  >98  Dead cows
Appendix 2: Abbreviations and conversion of units of measurements

1. Abbreviations

- k: kilo or thousands
- M: mega or millions
- mm: millimetre
- cm: centimetre
- m: metre
- ha: hectare
- mL: millilitre
- L: litre
- J: joule
- MJ: megajoule
- min: minute
- hr: hour
- yr: year
- mg: milligram
- g: gram
- kg: kilogram
- t: tonne
- lb: pound
- ft: foot
- $: dollar
- c: cent
- <: less than
- >: greater than

2. Conversion of Imperial units to metric units

- Length: 1 inch = 25.4 mm
  1 foot = 30.5 cm
1 yard = 0.91 m
1 mile = 1.61 km

Volume:
1 cu ft = 0.028 m³
1 pint = 0.57 L
1 gallon = 4.54 L
1 bushel = 36.4 L
1 acre foot = 1.23 ML

Area:
1 acre = 0.40 ha
1 sq mile = 2.59 sq km

Weight:
1 ounce = 28.3 g
1 pound = 0.454 kg
1 hundred weight = 50.8 kg
1 long ton = 1017 kg (2240 lb)

Energy:
1 calorie = 4.19 joules

Density:
1 lb/ft³ = 0.063 kg/m³

Rate:
1 gallon/acre = 11.23 l/ha
1 pound/acre = 1.12 kg/ha
1 gallon/ton = 4.17 l/tonne

Pressure:
1 pound/sq in (psi) = 1.45 kPa (kilopascals)

Yield:
1 lb/ac = 1.12 kg/ha

Temperature:
°F = ((9/5) × C) + 32
1 degree F is equivalent to 0.56 degrees C
50°F = 10.0°C
60°F = 15.6°C
70°F = 21.1°C
80°F = 26.7°C
90°F = 32.2°C
100°F = 37.8°C
110°F = 43.3°C

3. Conversion of US units to metric units

Volume:
1 gallon = 3.79 L
1 bushel = 35.2 L

Weight:
1 hundred weight = 45.4 kg
1 short ton = 907 kg (2000 lb)

Milk prices:
$10/hundred weight = 22.0 c/L

Forage maize yields @ 30% DM:
25 ton fresh weight/acre = 16.8 t DM/ha

Food energy:
1% unit TDN = 0.185 MJ/kg DM of metabolisable energy
30% TDN = 3.7 MJ/kg DM of ME
40% TDN = 5.5 MJ/kg DM of ME
50% TDN = 6.4 MJ/kg DM of ME
60% TDN = 7.4 MJ/kg DM of ME
70% TDN = 8.3 MJ/kg DM of ME  
80% TDN = 9.2 MJ/kg DM of ME  
1 MCal/lb = 9.22 MJ/kg  
1 MCal/kg = 4.19 MJ/kg

### 4. Conversion of other specific country units to metric units

Most countries now use the metric units of measurement, but certain countries have their own historical units, which are still used by farmers and advisers.

**China**

| Length:    | 1 chi = 33 cm  
|           | 1 li = 500 m  |
| Volume:    | 1 gongsheng = 1 L  |
| Weight:    | 1 jin = 500 g  |

**Thailand**

| Length:    | 1 nui = 2.1 cm  
|           | 1 kheup = 25 cm  
|           | 1 sawk = 50 cm  
|           | 1 waa = 2 m  
|           | 1 sen = 40 cm  
|           | 1 yoht = 16 km  |
| Weight:    | 1 baht = 15 g  
|           | 1 tamleung = 60 g  
|           | 1 chang = 1.2 kg  
|           | 1 haap = 60 kg  |
| Area:      | 1 sq waa = 4 sq m  
|           | 1 ngaan = 400 sq m  
|           | 1 rai = 1.6 ha  |
Appendix 3: Expectation and evaluation forms for workshop

IMPROVED HERD MANAGEMENT FOR HIGH GRADE DAIRY STOCK

Expectations of workshop

Location: ................................................................................................................................................

1. Name: ................................................................................................................................................

2. Address: ..............................................................................................................................................

3. Position held (farmer, dairy cooperative staff, milk collection centre staff, government adviser):
   ................................................................................................................................................................

4. How many milking cows do you have?
   ............................................................................................................................................................

5. What is your total number of dairy stock (calves, heifers, cows, bulls)?
   ............................................................................................................................................................

6. How many acres of land do you have growing forages?
   ............................................................................................................................................................

7. How many litres of milk each day do all your milking cows produce (on average)?
   ............................................................................................................................................................
8. What topics would you like to learn about in this workshop?
   a) ................................................................................................................................................
   b) ................................................................................................................................................
   c) ................................................................................................................................................

Please answer the following questions with a Yes or No

<table>
<thead>
<tr>
<th></th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. Should your country be importing high grade dairy heifers from other countries?</td>
<td></td>
</tr>
<tr>
<td>10. Do you think government staff are aware of the need for improved management of these animals?</td>
<td></td>
</tr>
<tr>
<td>11. Do you think farmers are aware of the need for improved management of these animals?</td>
<td></td>
</tr>
<tr>
<td>12. Should farmers be selected on the basis of their herd management skills?</td>
<td></td>
</tr>
<tr>
<td>13. Do many farmers have the skills to manage imported heifers to achieve high milk yields and fertility?</td>
<td></td>
</tr>
</tbody>
</table>
IMPROVED HERD MANAGEMENT FOR HIGH GRADE DAIRY STOCK

Evaluation of workshop

Location: ...........................................................................................................................................

Participant’s name: ........................................................................................................................

1. **Expectations:**
   What were your expectations of the workshop? Please list:

2. **Outcome:**
   What knowledge have you gained from this workshop?

3. **Relevance of training:**
   Please describe how this training will be of use to your work.

4. **Program delivery:**
   Please tick the appropriate space to indicate your views on the way the workshop has been delivered.

<table>
<thead>
<tr>
<th></th>
<th>Not enough</th>
<th>About right</th>
<th>Too much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall program</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lectures and/or formal instruction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visits on site/fieldwork</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading matter provided</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **Services:**
   How do you rate the services provided for you? (Please tick)

<table>
<thead>
<tr>
<th>Please tick</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Not good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training/trainers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training location</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Other ...........................................................................................................................................

6. **Other comments:** .............................................................................................................

   .....................................................................................................................................................

7. **Overall assessment:**
   How do you rate this program in terms of its relevance to your role in the dairy industry? (Please tick)

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Not good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal relevance to you</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. What are the weaknesses of the workshop?

..................................................................................................................................................
..................................................................................................................................................
..................................................................................................................................................

9. What improvements can be made for future workshops?

..................................................................................................................................................
..................................................................................................................................................
..................................................................................................................................................

10. List the most important messages/information that you found most useful to you.

..................................................................................................................................................
..................................................................................................................................................
..................................................................................................................................................

11. List the least useful messages/information that you found least useful to you.

..................................................................................................................................................
..................................................................................................................................................
..................................................................................................................................................

Please rank the following questions for their importance to you (1 to 5), where 1 is low/not much and 5 is high/a lot.

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. How do you rate farm visit?</td>
</tr>
<tr>
<td>13. How do you rate small groups and reporting back sessions?</td>
</tr>
<tr>
<td>14. How do you rate overhead presentations?</td>
</tr>
<tr>
<td>15. How do you rate importance of improved herd management skills in your job?</td>
</tr>
<tr>
<td>16. How much have you improved your knowledge of herd management skills?</td>
</tr>
<tr>
<td>17. How well will you be able to apply knowledge to farmer situations?</td>
</tr>
<tr>
<td>18. When should you do a refresher course?</td>
</tr>
<tr>
<td>Please score 1 for 3 months; 2 for 12 months; 3 for 2 years; 4 for never</td>
</tr>
</tbody>
</table>

Thank you for your participation in this workshop
Tips For Proper Managing of Dairy Cows On Indonesian Smallholder Farms

All dairy cows have one thing in common, their milk production and quality are directly related to the way they are looked after, and the way they are milked. Caring and gentle treatment directly affects a cow’s well-being, improving its milk production and general health.

**A. Housing for Dairy Cows**

To ensure that the cows are in a proper environment resulting in higher milk production, the animals must be in proper shelters:

1. The cows must be in comfort with adequate light and ventilation
2. The cows must be under cover protected from strong winds, rain, high or low temperatures. The shed should have good air movement, i.e. open structure with rain proof roof
3. The shed must have a well drained floor for ease of cleaning. The floor should be kept dry and preferably made of concrete
4. The shed should be situated on a well drained and preferably elevated site, manure disposal should be done properly
5. The shed must have clean and smooth surface feed troughs to prevent accumulation of feed waste
6. Adequate supply of clean water is necessary
Tips For Proper Managing of Dairy Cows On Indonesian Smallholder Farms

B. Livestock Health and Hygiene

A good dairy farmer should be capable of detecting the early symptoms of ill-health in dairy cattle and to take steps to eliminate the sources of disease on the farm, e.g. contaminated water supply, infected buildings or roughages, etc. Other important factors are:

1. Keep the cow’s hooves dry and trimmed clean to prevent infection and maggot infestation.
2. Be alert for “heat” sign detection and for subsequent calving (parturition).
3. Remove the dung/manure from the shed twice a day & dispose of properly.
4. Heaping of the manure should be at sufficient distance from the shed (minimum 10 metres). To prevent propagation of flies, the heap should be removed every 2 or 3 days. If the heap is close to the shed, ammonia and flies can contaminate the milk.
5. Daily removal of unconsumed feeds to prevent putrefaction and contamination of fresh feeds, and also to prevent “feed rejection” by the cows.
6. Weekly supply of inexpensive dry bedding (e.g. straws). Should be more frequent during calving and wet season.
7. Udders must be checked regularly for wounds, inflammation, mastitis, etc.
8. Regular tail clipping/trimming to reduce parasite infection and contamination.
9. Cows should be exercised after morning milking. Cows should be out of the shed for a minimum of 1 hour per day.
10. Regular de-worming and removal of external parasites (e.g. ticks, lice), consult your veterinarian.
Tips For Proper Managing of Dairy Cows
On Indonesian Smallholder Farms

C. Recommended Feeding

Follow the recommendations from the dairy training centre, i.e. a cow must eat the right quantity and the right quality of green roughage and concentrates, depending on the stage of development (calf, grower, heifer, pregnant, dry cow, bull) and milk production level (higher milk production needs more feeds) to maintain satisfactory milk production and ensure cow gets back in calf within 100 – 150 days of calving. Ideally milking cows should be fed 40 – 50 Kg fresh, high quality forage each day plus 1 kg quality formulated concentrate per 1 – 2 L milk. Wet or dry (ampas tahu, onggok, rice bran) by products can substitute for some of the concentrates so long as they.

D. Dairy Farmer Personal Hygiene

1. Clean hands with soap before milking
2. Avoid udder contacts when hands have open wounds or when you are ill
3. Avoid spitting and open nose blowing during milking
4. Do not smoke during milking (clove cigarette smoke spoils the milk flavour)
5. Annual health check with physician for contagious diseases (e.g. tuberculosis)
Tips For Proper Managing of Dairy Cows On Indonesian Smallholder Farms

E. Recommended Milking and Milk Handling

1. Always use clean milking made from stainless steel or aluminum after milking utensils.
2. Ensure availability of adequate supply of clean water.
3. Reduce sudden noise levels when milking. A disturbed cow may not "let down" her milk completely if she is excited, frightened, stressed or in pain.
4. Morning and afternoon milking at same times each day.
5. Teat to be wiped with a dry and clean cloth or paper towel before and after milking. If udder is very dirty, it should be washed with clean water.
6. All quarters (udders) should be completely emptied of milk to reduce mastitis risk.
7. Feed small amounts of concentrates during milking.
8. Use only recommended and safe detergents in hot water cleaning.
9. Milk to be kept as cool as possible to minimize bacterial growth, deliver to TPS/KUD quickly, avoid leaving the sun.
10. Do not let morning milk over to afternoon or afternoon milk to next morning.

Important:
IF COWS SHOW SIGNS OF ILL-HEALTH, CONTACT IMMEDIATELY THE DAIRY CENTRE OR VETERINARIAN ON DUTY.

All these recommendations will ensure that the dairy cows will remain healthy, thus increase milk production and improve milk quality which result in higher income.