添付資料10-1 20 Golden Rules (英語)

20 Golden Rules to have your cows more productive!



Essential techniques all the dairy farmers should and can practice with a minimum or without cost





* This manual was developed by the JICA Dairy Development Project in collaboration with DAPH Northern Province, and the techniques listed are suitable for the dry zone areas.

Foreword

Dairy farming in Dry zone in Sri Lanka faces unique challenges due to the arid climate. Until now, the lack of a comprehensive technical training manual for the dry zone dairy farming has been hurdle for small and medium scale dairy farmers. This manual is the first attempt to address this situation by compiling essential dairy farm management techniques in a way that easily accessible and affordable for small holder dairy farmers.

Through the JICA-Dairy Development Project we have dedicated ourselves to demonstrating suitable and applicable techniques with gathering best practices in dry zone dairy farming. We have been fortunate to receive support from JICA experts in collaborating with VSs and LDIs from DAPH-NP, ensuring that the manual reflects the needs and realities of the field.

We sincerely hope that this manual will be widely used not only in Northern Province, but also in other Provinces in Sri Lanka, specially in the dry zones. We believe that by acquiring the techniques outlined in this manual, dairy farmers can improve the productivity of their farm for better income, by unlocking the hidden potential of Sri Lankan dairy farming. We believe this manual represents a positive step towards a more prosperous and self sufficiency in milk and other dairy products in near future in this country.

Dr. S. Vaseeharan Provincial Director, DAPH-NP

A Message From DDP-NP Project

For small-scale dairy farmers, "Appropriate Dairy Techniques" are not one-size-fits-all. It varies greatly depending on the area and the specific circumstances of each farm. Therefore, Livestock Development Instructors (LDIs) must disseminate dairy techniques while taking these diverse situations into account.

Over the five years, our JICA DDP-NP project, in collaboration with staff from the DAPH-NP and DD offices, as well as VSs and LDIs in VSOs, has diligently compiled essential and effective techniques for improving the small-scale dairy farms. These techniques are presented in this manual as the "20 Golden Rules", and this editorial effort was led by Dr. Hideki Saito.

This manual is designed for VSs/LDIs and the information within will need to be "translated" into terms that are easily understandable for dairy farmers. This requires each officer to adapt the content to suit their specific field conditions. While this manual is primarily developed for the Dry Zones, most of the techniques are applicable across Sri Lanka. We are confident that this manual will prove beneficial to small-scale dairy farmers in Sri Lanka.

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General idea about 20 Golden Rules

- It contains essential and effective dairy practices, which will be selected or innovated and, finally, compiled <u>through concerted efforts of all the technical members</u> (PD, DDs, VSs, LDIs, and project members including Japanese)
- Then, with the help of LDIs, its content will be disseminated to ordinary small-holders who, as a whole, produce a great majority of raw milk in the NP

Some specific points about how to use this Manual

- Although the contents of this manual will be transferred to the ordinary dairy farmers, the Manual itself is <u>NOT prepared for the direct use of farmers BUT for the technicians, especially, LDIs</u>, as a guidance manual when they do extension activities for the famers.
- Thus, in this manual there could be some technical terms or expressions which would be difficult for the farmers. The technicians should be aware of this point, and, when applying to the farmers, "translate" them most appropriately.

Contents of 20 Golden Rules (GRs)

#	Essential techniques	#	Essential techniques
1.	Give your cows what they need!	11.	Do not let your calf stay all the time with its mother!
2.	Let's get to know of the limitation of grazing!	12.	Be selective about your breeding!
3.	Try to increase options of feedstuffs!	13.	Dry off your cows properly!
4.	Be aware of when and how you give the feed!	14.	Follow the standardized animal health program
5.	Protect your cows!	15.	Milk more than once a day!
6.	Make a crush!	16.	Be selective about your milking utensils and keep them always clean and dry!
7.	Observe always your animals!	17.	Keep your milk and milking environment always clean!
8.	Give more attention to your calves and heifers!	18.	Keep your milk in a cooler place and dispatch it as soon as possible!
9.	Check cows before taking them in and out!	19.	Keep basic records and make better use of it!
10.	Be aware of pregnancy check and due date!	20.	Check the account of your dairy farming!

Practice-finder

	Feed development		Dairy cattle management		Reproduction	8	Animal health and milk hygiene		Farm Record		
	T										
#	Practices	#	Practices	#	Practices	#	Practices	#	Practices		
1	Give your cows what they need!	5	Protect your cows!	10	Be aware of pregnancy check	14	Follow the standardized animal	19	Keep basic records and		
	Let's get to know	6	Make a simple		and due date!		health program		make better use		
2	of the limitation of grazing!	7	Observe always	11	Do not let your calf stay all the	15	Milk more than once a day!	20	Check the		
3	Try to increase		your animals:		time with its		Be selective about	20	account of your		
U	options of feedstuffs!	8	of your calves and heifers!	12	Be selective	16	your milking utensils and keep them always clean and		dany fanning:		
4	Be aware of when		Check cows before	12	breeding!		dry!				
4	and now you give the feed!	g	taking them in and out!	13	Dry off your cows properly!	17	Keep your milk and milking environment always clean!				
						18	Keep your milk in a cooler place and dispatch it as soon as possible!				

Some other aspects we should be aware of from the point of view of international development arena:

Nowadays, in this arena, there is a growing trend towards integration of socially significant concepts or concerns into donor project modules regardless of the area of activities. Among others, *Gender Equality* (GE), *Environment Preservation* (EP), *Climate Smart Agriculture* (CSA), and *Animal Welfare* (AW) are four of the commonly observed concepts or concerns, and, in fact, almost all the practices recommended in this manual have much to do with some of these aspects as well, esp. in the practices shown below. We, as extension service providers, should be aware of this trend:

GR-No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Examples, Messages, etc.
GE					•			•		•			•		•	•	•	•	•	•	Women are excellent caretakers of calves
EP		•	•		•	•															The use of roadside grasses is crucial for EP
CSA*	•		•	•				•	•	•		•		•			•		•	•	With CSA farmers protect cows and the earth
AW													•								AW is now a part of animal health

*Based on the key performance indicators (KPI) of the Climate Smart Dairy (CSD) which were introduce by Market-Oriented Dairy Project (MOD, USDA)

[Important] Some of these practices related to GE, EP, CSA and AW might pose some challenges for farmers to implement. In such a case, extension agents (LDIs) should not force them. Never let your recommendations be an obstacle to practice. Be compassionate and try to make them understand little by little by showing the big picture of things!

No.1

Give your cows what they need!

Takeaway messages:

Cows should eat a proper amount of feed, and the feed should be well-balanced Points we should disseminate to dairy small-holders are as follows:

- The main feedstuffs cows should take:
 - ✓ <u>Water</u>
 - ✓ <u>Fibers (=roughage)</u>
 - ✓ Grains (=high-energy feeds) and
 - ✓ <u>Supplements</u>
- What amount of each feedstuff cows should take?
 - ✓ As to grass, on a Dry Matter (DM) or As-fed basis?
 - ✓ How to convert DM into as-fed?
 - ✓ As to concentrates, how much should we give?
- How to weigh the feedstuffs at a farm?
- How much grass a grazing cow takes per hour?

What should a cow eat?

There are 4 feedstuffs, which are: **Water**, **Fibers** (roughage), **Grains** (=**high-energy feeds**) and **Supplements**

Water is, as might be expected, not a nutrient on its own, however, it is indispensable in many ways and quantities to keep a living thing alive and to help it grow. The body of a cow is composed of 70-75% water, and milk is about 87%! So, a cow needs a lot of water! Please do not forget the importance of water!!

Fibers/Roughage are the staple for cows as a ruminant*. Without them, they cannot maintain their ruminant nature. (*Grass-eating animals that bring back food from their stomach)

Cows can live without Grains. But, dairy farmers may need them because with grains animals would give more milk and grow bigger and faster. But please remember that not all the cows are responsive to grain feeds as you think.

Cows do not have to take too much of Supplements like salt and minerals. But they are vital nutrients that an organism requires in limited amounts.

How can we provide Water?

Some modern type watering system at a farm...



A large trough at a core farm

♦ While grazing...

- Buckets
- · Creaks, or rivers



Automatic watering system at a core farm

Here, farmers should be aware of the temperature of water! Sometimes, in the sun, drinking water could be baking-hot!

Concerning the amount of feed intake, one of the most important points is...:

DM (=Dry matter) or **As-fed** (=Natural)?

Here, **DM** is that portion of the feed remaining after all the water has been removed, and, by contrast, **As-fed** is the status before removing the water (=natural status).

For instance, a textbook may say that:

"A cow should take an amount of the staple feed such as fiber/roughage* equivalent to 2.0 % of its body weight, on a DM basis, per day."

But, since this expression is not intelligible to all the farmers, it would be much better to show them specific amounts on a natural basis (as-fed) by using a representative examples

*In the case of "normal" grasses meaning the grass which is nutritionally in the normal range.

DM or As-fed?

- ✓ Supposing that an ordinary milking cow in the NP, say, a Jersey cross type, weighs about 400 kg.
- ✓ Thus, the DM amount of the staple feed it should take is: 400 kg x 0.02 (2.0%) = <u>8 kg</u>
- \checkmark Now this amount should be converted into As-fed basis.
- ✓ Supposing roughly that the moisture content of grasses is <u>70 to 80%</u>.
- ✓ Thus, the amount of grass ordinary cows should take is: In the case of 70% = about <u>27 kg</u>

In the case of 80% = <u>40 kg</u>

Let's see an example!

For instance, if you have <u>**10** kg</u> of natural grass with the moisture content of <u>**80%**</u>:



Let's see another!

Now, you have <u>**10 kg**</u> of natural grass with the moisture content of <u>**70%**</u>:



How about this?

And finally, if you have <u>**10 kg**</u> of **Paddy straw** with the moisture content of <u>**20%**</u>: (Even hay like paddy straw retains moisture!)



How much <u>concentrates</u> should be given?

As to concentrates, based on the surveys at dairy small-holders in the NP as well as various reports in the tropics, we'd like to recommend the following formula to our farmers:

Daily production/cow	≤ 6 L	6~9 L	10~14 L	≥ 15 L
Amount of concentrate	None*	1~1.5 kg	2~2.5 kg	≥ 4 kg
	*	1.101	1.41	

*or could be given a bit but never exceed 1kg

Also, things we should consider carefully are that:

- 1) If you give a good amount of improved grasses such as CO5, you can decrease the amount shown above, and,
- 2) The nutritional value of different concentrates may vary a lot from one company to another.

Thus, depending on these situations, the amount of concentrates should be adjusted appropriately.

Here, let's take a look at "Nutritional values"!

As mentioned in the previous page, the nutritional value of different concentrates varies a lot. The following are the data from various feed plants in NP:

Major feed plants	Crude Protein (%)	Crude Fiber (%)	Ash (%)	Ca (%)	Kcal/kg
А	16.5	4	10	1.0-1.5	2,400
В	16.0	6	8	0.8	2,400
С	16.5	4	9	1.0-2.0	2,500
D	15.6	4	3	0.68	2,850

It is obvious that every company goes with its own formula. So, farmers should be aware of that point.

[a rule of thumb] roughly speaking, the following ratio would be fine for preparing a well-balanced protein-based diet:

Carbohydrates : Protein= 2 : 1 (salt and mineral could be added as supplement)

[one more message] <u>Considering the current situation of</u> <u>Sri Lanka</u>, all the more reason, we should economize, for instance, on feeding:

- ✓ By trying to use commercial concentrates as less as possible since this takes up a great majority of expenditure
- ✓ By trying to find other alternatives (See No.2)
- ✓ By trying to use feedstuffs which are less costly, for instance, home-grown grasses (See No.3)

Also, on managing:

✓ By improving the herd through selection of cows so that you will get the same amount of production from fewer cows with less costs (See No.12).

Those are the additional points we should recommend to farmers!

[Summary] <u>How much</u> should a cow take per day?

Types	Amounts
<i>Water:</i> -Medium size cows -Large cows and bulls	- <u>60 to 80 L</u> (Give more in hot seasons) - <u>80 to 100 L</u> (Give more in hot seasons) *water supply with no restriction, i.e. available 24 hrs would be most ideal
<i>Fibers:</i> -Green grass (as-fed)	- <u>25 to 40 kg</u> (in the case of hay: <u>8 to 10 kg</u>)
<i>Grains:</i> -Commercial concentrates	-Dependent on the individual milk production. Try to give less than <u>4 kg</u> to your cows unless their production exceeds <u>15 L</u>)
Supplements -Salt -Minerals (commercial type)	-Ideally ad libitum take (without restriction). -As indicated in the package*.

^{*}Among various minerals, **Ca** provision may have **to be reduced** for one month before the calving in the case of cows that have been frequently affected **Milk Fever** (=hypocalcemia, lowered levels of blood calcium) and/or a high yielder (> 30 L/day). This advice may sound paradoxical, but, by reducing the **Ca** provision from the diet, you will let cows start mobilizing their stored **Ca** from the body for the time when the requirement of **Ca** increases prominently (milk synthesis around calving). In practice, however, the most cows in NP would not be in this category.

How can you weigh?

If you have some weighing tools, it's ideal. If not available, you can guess by using something you have in your farm!



No.2

Let's get to know of the limitation of grazing!

Takeaway messages:

Just because you are grazing your cows does not mean you are providing a good amount of grass, especially in NP! When you graze your cows, you have to guess <u>how much</u> grass they are eating.

They say* that on a field covered with plentiful grass, a cow may take <u>5kg fresh grass</u> per hour.

But, since in the NP we generally graze cows on rather bare fields, we should guess less. Maybe <u>1 or 2 kg per hour</u>...at the most. So, grazing your cows a couple of hours does NOT mean that you are giving a good amount of grass to your cows

Here, together with observation practice such as BCS (See No.7), you can guess!

*van de Goor, S (2016). Improvement of calculation methods for net grassland production under different grassland utilization systems

If your cows are put out to pasture as shown below, then animals may get 5 kg fresh grass per hour! On the other hand, if cows are in "grazing" lands as shown below, then you should consider the amount as a minimum!





No.3

Try to increase options of feedstuffs!

Takeaway messages:

In your region or your farm, there should be something you can use or grow for increasing feedstuffs.

The important points that should be transferred to farmers:

• Feedstuffs which should be utilized more in the NP:

- ✓ <u>Leaves</u>=of Banana, Palmyrah, Coconut, Jack fruit, etc.
- ✓ <u>Flowers or Stems</u>=of Banana, etc.
- ✓ <u>Crop residues</u>=Rice straw, rejected vegetables/fruits, etc.
- ✓ <u>Leftover from farms</u>=Whey, Rice water, Banana peel, etc.
- ✓ <u>Others</u>=Roadside grass, Poultry litter (acceptable in SL?)
- ✓ Agricultural By-products=Gingelly poonac, Coconut poonac, Molasses

Urea-Molasses block not available in the NP -



[Warning!]

Some feedstuffs, for instance, 1) <u>Leguminous plants</u>, and 2) <u>Molasses</u>, should not be given a lot at a time.

Having home-grown plants would be an excellent investment for dairy farming:

Plants which can be cultivated successfully in the NP but are still NOT utilized extensively:

/ Improved grasses=CO3, CO5, etc.





A field trial of CO5 re-planting done by VS technicians and the Project staff

A couple of months later (at a core farm)

the timing of the first harvest and frequency of subsequent cuttings

Generally speaking...

- 1st cut should be at <u>60 to 80 days</u>, then,
- Subsequent cutting, between <u>40 and 50 days</u>, but,
- Be aware of conditions: soil, climate, seasons, and management (See No.19).

In any case, farmers should <u>**BE CAREFUL NOT**</u> to miss the timing of cutting. Normally during the wet season they should harvest more frequently. Observation of grasses is the key! When grasses are too **itchy**, **stemmy**, or **woody**, it is too late! What is more is that **Crude Protein** (CP) of Napier grass, of which CO5 is one, **drops markedly when > 6.5 feet (200 cm) high**!

<u>One last message</u>: Even perennial grasses, which live for years, including CO3, CO4 or CO5, their productivity may decrease considerably at some point, especially around 5 years after planting. Thus, farmers should be aware of this tendency and may have to consider re-planting with necessary treatments, e.g. tillage, fertilization, elimination of vegetative residues, etc.

In the future, you can give a try to "Rotational cut-and-carry"

◆ First, you should know how much grass is needed per day. For instance, if you have 2 cows, approximately 400 kg/body weight each, and if the moisture level of the grass is 70%, then, as we saw in No. 1 (P.10), you will give about 27 kg of grass as fed per day to each cow. Based on the average fresh matter yield of the CO5 plant, you may need around 12 CO5 plants to get around 54kg. Now, you should check what extent of grass cultivation areas you need to get 12 plants of CO5, meaning that you will need a plot of 9 x 12 ft² to get the amount as shown in the figure below.

• Second, you should know the necessary rest period, namely, the cutting interval. Supposing that your CO5 needs 41 days to be regrown to be cut again, then, you need 42 plots of the size: 9 x 12 ft² as shown below (54 x 84 ft²).

• <u>Now</u>, you will start cutting from the 1st plot, then moving to another every day until you will come to the last. So here each plot will be with 1 day of maturity gradient By that time, the 1st plot will be ready again.

*The cultivation can be done with the time availability of the farmer, for instance, he can cultivate for 5 days in a week and with 2 days of rest, which will not greatly impact maturity of the grass plots.





XYou can also cultivate CO5 in the same way for 5 plots at the same time in order to harvest each plot every day, if it is difficult for a farmer to manage the plots on a daily basis.

Other home-grown plants that should be taken advantage of:

- The following plants are not utilized extensively in the NP, but they could be cultivated successfully:
 - ✓ <u>Leguminous trees</u>=Gliricidia, Leucaena, etc.
 - ✓ <u>Other fodder trees</u>=Thespesia, Mulberry, etc.
 - ✓ <u>Aquatic plants</u>=Azolla, etc.



Living fences by using Gliricidia at a core farm



Various fodder trees: Leaves of Thespesia (L) and Mulberry (R) at a core farm



Azolla is highly productive (at a core farm)

Together with home-grown plants, farmers can use the manure from their own cows for their cultivation, for instance, by preparing composts Some examples are as follows:



A compost bin at a core farm



A compost heap at a core farm

<u>Remarks</u>: If your compost is immature* or if you apply too much at a time, plants could be burnt or roots damaged. Also, excessively fertilized crops may cause nitrate poisoning. Thus, please be careful about the maturity and the amount of the compost (*typically with a putrid odor and not yet sufficiently fermented under anaerobic conditions)

Also, farmers can use the manure for bio-gas production!



[A dairy farmer, Mr.Kiritharan at Chavakachcheri] This farmer is using slurry to his grass field and compost making after the gas extraction from a simple plant (a bio-digestor). This is another use of cow-dung at dairy farm!

Still one other point which is highly important in keeping home-grown plants sustainable is how to control weeds

i) **Mulching:** by using agricultural residues or bedding materials as compost you can control not only weed but also keep moisture, reduce compaction and conserve soil biota.





ii) Zero tillage (also scratch ploughing): This is one of the most important and highly recognized sowing methods in crop-farming, meaning that, as the name implies, no or minimum tillage is applied between harvest and sowing. Doing so, you can control not only weeds but also prevent land erosion



No.4

Be aware of when and how you give the feed!

Takeaway messages:

Did you know that, depending on when or how you give it, the same feed could be more nutritious and even "tasty"!

How a farmer can improve efficiency of the use of feedstuffs?

1: <u>By just chopping</u>, you can increase the intake of grasses and, consequently, decrease the leftover:



By a special machine (at a core farm)



By a manual cutting tool



By a *koduva Kathi* (Felling knife)

2: <u>By being choosy when cutting grasses</u>, you can increase the appetite of cows and even nutritional value.



Choose a type of grass that looks tender and makes you feel hungry: Not too leafy, Nor stemmy



Try to get grasses assorted especially when picking roadside grasses

As mentioned in No. 3, by controlling the period between cuttings (re-growth), or the height of forage, esp. Napier Grass, you can increase the quality of grass (Amount of Crude Protein: CP):

- ✓ If you harvest a bit more frequently, say, at 20 to 30 days, you will get more CP!
- ✓ If you harvest your CO5 when 1.6 to 2.5 ft (50 to 75 cm) high, you will get the maximum amount of CP!
- And, if you leave your Napier without cutting more than 60 days or higher than 5 ft (150 cm), the grass will get less and less nutritious.

3: <u>By treating some feedstuffs</u>, you can improve nutritional value and increase the storage life.

I- Practical silage making at a core farm by using a simple plastic drum

II- Urea or jaggery

treated straw



4: <u>By wilting fresh grasses</u>, you can make your cows eat more grasses, thereby increasing the grass intake.

<image>

A hand-made wilting rack in a core farm

Putting some grass before giving cows

5: <u>By changing the feeding time or adding one more ration</u> <u>during the night.</u>

Just adding one more ration, dairy famers will get more...

[Conventional]

One ration In the morning

- Another ration in the after noon (or just grazing)
- Another ration in the evening

[A new method]

- One ration In the morning
- Another ration in the after noon (or just grazing)
- Another ration in the evening
- Still another* during the night time (between 22:00 and midnight)

*Here, another ration does NOT mean a feast such as the full amount of concentrates. Just hay or some fresh grass would be enough. Advantages are:

- ✓ More production
- ✓ Farmers can do heat detection (See No.7)
- ✓ During the night, since no heat stress, it gives cows a good appetite.

6: By mixing more than two feedstuffs, you can get a simple TMR.

TMR stands for *Total Mixed Ration* which is nutritiously balanced and highly sophisticated ration, esp. for high-yielding cows. Here, however, we are not talking about it. But something similar in terms of mixed and highly palatable!

One of our core farmers is practicing an ingenious way of using fodder grass. He uses CO5 for two different rations!



Warning: Here please do NOT think that, when you use cultivated grasses, you have to always cut first only the leaf part by leaving the stem part to use at a later time as shown above. The above case is just an example. So, of course, farmers can use them as they wish!

[Complimentary information to the practice No.4]

Basic Quality characters of major improved grasses and fodder trees*

	CO3	CO4	CO5	Red Napier	Gliri- cidia	lpil- ipil
Dry matter (DM, %)	17.0	21.3	22.0	12-13	22.6	16-17
Crude protein (CP, %)	10.5	10.7	14.0	13-14	21.5	20-22

*Sources: Crop Production Guide, Rivashaa (India), Perera (Peradeniya), Haryani, H. et al. etc.

Finally, please remember that if your "grass" quality is good, for instance, its CP% is more than 18%, and digestibility (very tender!) is high, you can reduce the amount of concentrates considerably, or even without concentrate you can get a good amount of milk! According to a study (Devendra, 1975), with a quality Napier variety (18.2%-CP and 70%-digestibility), but without concentrate, a medium size crossbred cow (400 kg) gives you 10 kg milk/day!

No.5

Protect your cows!

Takeaway messages:

Cows should be protected properly to give them comfort or to keep away from stressors

First of all, we animal technicians should show farmers what "comfort" and "stressor" mean to cows

For instance, we may ask farmers which would they prefer...

- A clean, soft, perfumed dhoti/saree or
- A dirty, irritating, stinky dhoti/saree?

Your answer would be obvious...

In this case, a clean one is **comfort**, and a dirty one is a **stressor**.

This is the basic idea of the concept called:

- Animal well-being
- ♦ <u>Animal welfare</u> or just simply
- ♦ <u>Cow comfort</u>

Maybe we don't have to teach these terms to farmers, but, for sure, we should share this concept with farmers. The key is, by providing comfort to cows, not only we are protecting them but also <u>improving the</u> <u>productivity</u> of dairy farming.

However, we are here not talking about a five-star condition. Rather, simple but secure surroundings for them in which they can spend their time free from:

- ✓ <u>Discomfort</u>, and
- ✓ <u>Pain</u>:

Like:

♦Heat stress,

- Dirty (dung-soiled) bedding materials,
- Bumpy floor
- Tethering too tight, etc.

Warning against cold stress!

Usually in NP, "heat stress" is one of the most important and commonest stressors. But, as we all witnessed it during the cyclone *Mandous* in 2022, <u>cold stress</u> could be one of them. This stress, coupled with the recent climate change and the North East monsoon, might be more frequent and serious in the future. So, please remember that good housing, esp. to protect animals from strong wind as well as good nutrition would be most crucial for it!

So, let's think how we can provide appropriate welfare to cows under miserable conditions



Cow sheds or shade structure

To protect cows from rain, wind, danger, attack or heat stress, it is ideal if farmers could provide them with a shed as well as shade structures, surely, according to the budget of farmers.



<u>A tip</u>: In the tropics, generally, if you place <u>the longitudinal axis</u> (-----) of a cow shed <u>east to west</u>, you can prevent the sun from heating the shed up too much. *If famers think about setting up, for instance, fences, plants, shades, to avoid direct sunlight, then this tip would not necessarily be the case. Representative designs of cow sheds are as follows (view from above)



Thus, the measurements of a cow shed you will need would be what kind of cow shed you prefer and how many cows you will put in it. To calculate it, you can use the following figures:



Also, when grazing and/or tethering cows, please be aware of the following points:

Please remember that inappropriate grazing or tethering may cause not only the loss or injuries of animals but also of pedestrians as well as motorists.



These wrong practices may cause many different types of accidents.

No.6 Make a crush!

Takeaway messages:

During any treatments or Al, for easy and safe handling, cows should be restrained properly

By showing these photos, let's ask farmers the following questions!



Do you think the cow is tame enough to manage?

So, now it would be obvious why we need a crush.

It protects both cows and ourselves, e.g. farmers, veterinarians, LDIs, and AI technicians during offering any type of treatments such as AI, rectal palpations, vaccinations, veterinary treatments and even surgical operations. Also important is that without a crush, since a cow will move or jump from side to side, she may get more stressed, thereby causing low conception rate. So, as you can imagine, crush-making would be in accordance with the concept of Animal Welfare as well!

Though simple, you should have a secure crush or the equivalent in your farm

These are the simple but robust ones by using locally available materials



Also, a makeshift type could be possible



By using an existing structure at your farm, you can get a structure which gives you the same function as a crush Here, by putting some additional wooden bars...

Maybe here a pole for tying a cow's head would be needed !





This is also a very ingenious type of crush which has an adjuster!





The head side should be a bid narrower than the tail side!

Combined with growth check! (See No.8)

Also important is the position of vertical bars





Vertical bars should be <u>outside</u> as shown in the <u>Correct</u> photo. Put <u>inside</u> as shown in the <u>Wrong</u> photo, vertical bars may damage animals when they move!

Finally, to put the finishing touches, please make sure that there are no <u>sharp edges</u>, <u>protruding catches</u>, <u>bolts</u>, <u>nails</u>, etc. that may injure not only cows but also us!

Lastly regarding the size of a crush, roughly speaking, the following would be a one-size-fits-all crush!



Lastly, some other points to be aware of...

- Try to set up your crush in the shade. Maybe you can take advantage of some trees.
- ✓ However, be careful about the coconut trees. A coconut can fall and hit you and your cows on the head!
- ✓ It would be ideal to use a durable and robust material to fasten the poles that won't get untied or slip easily, preferably, metal (02~3mm) or damage-resistant nylon wires. Here, if you use metal wires, be careful of sharp edges not to hurt both cows and operators!
- Also important is to learn how to manipulate a cow that refuses to enter the crush. In such a case, farmers or operators should NOT force them. Just by giving a gentle pat on the rump or a soft-spoken word, or maybe putting some fresh grass or concentrates to the other side of the crush, try to have them in and do the same practice once in a while.

No.7 Observe always your animals!

Takeaway messages:

Observing your animals, you can localize potential problems before they become major headaches

What should farmers observe?

Among others, we should tell them at least the following <u>3 points</u>:

- ♦ General vital signs:
- Simple BCS
- Heat detection

General vital signs:

- ✓ <u>Respiration</u>: Breathing heavy, punting or coughing?
- ✓ **Coat**: Smooth and shiny?
- ✓ **<u>Rumination</u>**: Normal?
- ✓ Gait: No difficulty walking?
- ✓ **Feed trough**: No leftover?
- In case you see a lot of leftover, try to find reasons:
- \checkmark Loss of appetite (could be getting sick!),
- ✓ Cows don't like it (unpalatable),
- ✓ Difficult to take (stem parts or too long leaves, etc.) or
 ✓ Giving more than necessary, etc.
- ✓ **<u>Urine</u>**: color should be slightly yellow, NOT reddish! (=hemoglobinuria)
- ✓ **Feces**: Check three C's= Color, Consistency, and Content.

More Grain and Less Fiber



More Fiber and Less Grain



Simple BCS (Body Condition Scoring):

As we all know, Body condition is a reflection of the body fat reserves, and condition scores range <u>from 1.00</u> (no fat reserves) <u>to 5.00</u> (severely over-conditioned). And condition scores should be between 2.75-3.25 during the lactation stage.

But, this could be too complicated to explain to farmers, thus, by simplifying the system, we will try to introduce just the following three categories:

- ✓ **Normal (a condition which should be)**:
- ✓ <u>Too fat</u>:
- ✓ <u>Too skinny</u>:

To guess the "simplified BCS", first you have to check a cow's hindquarters



Skinny

A = Hip Joint (Distinct V shape)

- **B** = Hook bone (Clearly visible)
- **C** = **Pin bone** (Clearly visible)



Normal

A = Hip Joint (Nearly V shape) A = Hip Joint (U shape)

B = Hook bone (Visible)

C = Pin bone (Visible)



Fat

- **B** = Hook bone (Invisible)
- C = Pin bone (Invisible)

Therefore, summarizing the check points, the following is a rough algorithm to tell Skinny, Normal or Fat.



Check the Hook bone. **Pin bone and Transverse** processes whether visible or invisible. If Clearly visible, Skinny!



Hip Joint



Check the Hook bone and Pin bone whether visible or invisible. If invisible, Fat!

or U

And, of course, there are cases, in which you don't have to guess. At a single glance, you can tell just *Skinny* or *Fat* as this poor cow!



Transverse processes are visible!



No need to check! Just tell the owner that his/her "daughter" need more feed and care!!

Important! Please be aware that almost all the cows whose BCS is **less than 2.50** (=skinny cows) as shown above, are NOT cyclic, meaning that they do NOT show any heat sign!!

Some other points to be aware of...

- In general, the BCS could be a bit higher during <u>the dry-off and</u> <u>calving period</u> than <u>the normal lactation period</u>.
- ✓ In the case of cows with a higher level of Indian blood, their hindquarters scoring could be sometimes not clear-cut.

Then, lastly, one more important point is...

Checking BCS is NOT an end of in itself. Checking BCS should exist **to know what to do next**. If you find a cow with a lower BCS, that means she is skinny, so she needs more feed! If a cow's BCS is extremely high, she is too fat. So check the amount of feed you are giving her, especially the amount of concentrates! (See No.1!)

Heat detection:

Especially for those farmers who are highly dependent on AI, heat detection is crucial. Thus, ideally they should practice the following points:

✓ **<u>First</u>: Check 4 times a day.**

Because, in the tropics...

A majority of cows express poorly the heat sign,

◆Also, many of them come into heat during the night time.

Thus, staying out there at least 10 to 15 min would be ideal:

- ✓ 1st: Before morning milking
- ✓ 2nd: At noon

✓ 3rd: After evening milking

✓ 4th: Before going to bed

✓ <u>Second</u>: Check from various aspects:

- Mucus vaginal discharge
- Mounting and/or being mounted
- Swelling and reddening of the vulva.
- Walk around a lot (restlessness)
- Bellowing
- Sudden drop in milk production
- Loss of appetite
- Restlessness of bulls (if you have), and also,
- Try to foresee by checking the previous heat (See No.11 and 19)

✓ <u>Third</u>: Call the VS office or your AI technician:

And tell them when exactly you found your cow in heat and what behavior she shown.



Additional info: When should a cow be inseminated?

To know when a cow has come on heat (=estrus) is not an easy task. In fact, you would never know exactly when. This figure shows the onset of heat and ovulation in a timescale together with other important events or recommendations:

Ontimal time to Al					ľ	Nost o	ptima										
								Vi	able								
Sperm viability		(24~30 hrs)															
Timing of Ovulation																	
Duration of heat	Ļ			A	verag	e: 15~	18 hrs	s (rang	ge=8 te	o 28 h	rs)						
	0	2	4	6	8 []	10 Hours	12 after	14 the c	16 onset	18 of he	20 at 1	22	24	26	28	30	32

Thus, as you can

imagine, it is too difficult for an inseminator to decide when to AI. In practice, however, there is a rule of thumb as shown on the right table:

for	If a famers finds a cow in heat:	Should be Al-ed:
	♦ After midnight until 9 a.m.	In the afternoon of the same day
of	♦ From 9 a.m. up to 12 noon	In late afternoon of the same day or next day early in the morning
	♦ In the afternoon ~	Next day in the morning

One last message about heat detection

To detect heat with efficiency, obviously, means to get cows AI-ed and hopefully pregnant with efficiency. In practice, however, not all the opportunities of detected heat should be used for AI.

Farmers may have to skip <u>the first heat</u> after calving, especially when it occurs <u>within 30 days</u>. Because it takes <u>at least 30 days</u> for a cow's reproductive tract (uterus) to return to normal. In general, "<u>45 days after calving</u>" would be the most acceptable timing.

Thus, please be aware of this point!
No.8

Give more attention to your calves and heifers!

Takeaway messages:

A calf or heifer, like your daughter or son, should grow healthy and sturdy. You have to know how to care about calves

Why more attention to <u>calves</u>? and What farmers should do for them ?

First of all, farmers should be aware that:

- ✓ A calf has <u>a future</u>,
- ✓ Its future is all dependent on how farmers take care of it.
- A calf without appropriate attention during the growing phase, esp. <u>from</u> <u>birth to 12 months of age</u> (=<u>critical period</u>) would be most important and determinant because it may cause permanent damage to growth potential including mammary development.

The practices farmers should do are...:

- Check the umbilical cord!
- Check the colostrum!
- Check the amount of rations for calves!
- Check the growth of your calves!

No amount of feed and care can make a good producer out of one whose "childhood" is poor in terms of nutrition as well as management!

Check the umbilical cord!

Once a calf is born, the umbilical cord begins to shrink and dry up. Eventually, it falls off (7 to 10 days), leaving a scar (the navel). This natural process works especially well when newborn calves are kept in a clean and dry area.

But, if this is not the case (=NOT clean and dry), try to check the cord often, and <u>disinfect it</u> by dipping the external part in a iodine solution or by spraying it with same solution at least once a day.

Check the colostrum!

Colostrum is, that is to say, the first vaccine for calves. But once in a while, this "vaccine" can fail or cannot be transferred appropriately <u>when</u>:

- ✓ Colostrum does not contain sufficient immuno-globulins (IgG) (a mass of <u>> 100 g of IgG</u> is necessary)
- ✓ Mother cows do not have the sufficient amount of colostrum
- ✓ Mother cows die or reject newborn calves trying to suckle, or
- $\checkmark\,$ Calves, for some reasons, cannot take the sufficient amount.

Warning: To reduce the calf mortality, checking the colostrum is a must!

When colostrum does not contain sufficient immuno-globulins (IgG)

To be sure, a mass of <u>100 gram of IgG</u> is necessary

Days*	-7	0	1	2	3	4		
lgG g/L**	>300	130	< 20***					
Viscosity	++++	+++	- (Nil)					
Color	Clear yellow	Milky yellow	Almost like normal milk					

*Relative to calving (=Day 0)

- **The amount of IgG in 1 liter of colostrum
- ***Remember that just one day after calving, IgG amounts fall sharply!

Generally, a newborn calf suckles <u>more than</u> <u>1L</u> at a time, so, as long as the colostrum is "normal" the necessary mas will be obtained! but, to be on the safe side, let's say that <u>more than 3L within 6 hrs</u> after calving!





Mango juice-like Honey-like stickiness color Good signs!

What can we do or should we do:

 \checkmark If mother cows do not have the sufficient amount of colostrum? or

✓ If mother cows die or reject newborn calves trying to suckle?

In such cases, there could be two options:

Option I: Try to get another fresh cow at your farm or neighbors

Option II:							
Get a home-made							
formula and give							
it twice!							

- Raw milk: 3 cups
- Boiled water: 1 cup
- Egg: 1 (without yolk)
- Caster oil^{*}: 2 tsps.
- ✓ Mixed well and given at 40C
- Put the egg last!

*caster oil could be replaced with cod oil which contains better fatty acids. Also, for your information, when caster oil is used, in some countries, the egg is given with the yolk.

Also important is the overfeeding of colostrum. Do NOT give it calves too much! As shown in the previous page, 3~4 L/calf/day in more than two occasions is enough.

✓ When calves, for some reasons, cannot take the sufficient amount.

In real terms, a great majority of reasons would be weakness, lethargy, depression of the newborn calves.

Thus, in this case, first by milking colostrum then by using a bottle, ideally a calf feeder (*See* photos), you should provide it to the calf.

But, **please remember that you should not force the calf to suckle.** Try to woo it into the mood with your finger after dipping it into colostrum.





Ideally, a calf should get a necessary amount within 2 hrs of the calving.

Check the amount of rations for calves!

Actually, there is no best way that fits all the famers. Each famer may find his/her best way by copying practices other farmers do or referring to technical information the following two.

E			1 st month		2 nd month			3 rd month					
farr	◆ Colostrum	<mark>3 d</mark>											
B	◆ Water				No restriction								
	◆ Fresh Raw Milk	F	rom 4 th	day to 4	15 th 45 (day (buc	ket)	₩	eaning				
a	♦ Concentrates	F	rom 4 th	(calf sta	arter), t	hen from	1 60 th (concent	trates fo	or cows			
e- :	♦ Grass												
ХШ	♦ Hay			N	lo restr	r <mark>iction</mark> (C)uality	hay is h	ighly im	portant!)		
			1 et				Ond	11.			Ord	th	
			Ist M	ionth			Z ^{nu} n	ionth			3 ^{ru} m	onth	
	♦ Colostrum	<mark>3 d</mark>											
arn	◆ Water		From	8 th day									
a f nal	♦ Fresh Raw Milk	Fi	rom 4 th	day afte	r each	milking	for 1 h	nour				Weanin	g 📛
	♦ Concentrates				From	20 th day	with r	ice brar	i, <mark>dahl</mark> h	lusk, et	c. (fron	n 500g)	
	♦ Grass					From 30) th (inc	cluding	grazing)			
	♦ Hay		From	8 th day	(Quality	hay is hi	ighly ir	nportan	t!)				
					4	0							

Check the growth of your calves and heifers!

To check the growth of your calves and heifers, if you have a scale for weighing would be ideal. But, at the farm level, generally this is NOT the case. Thus, by measuring wither height or maybe chest girth, you can check the growth.

Because both wither height and chest girth are proportional to body weight. So, you can use either of them as an indicator for calf and heifer growth.



Which calf or heifer is growing well?



Compare the two set of red dot lines (•) of both figures. Note that while the calf on the left follows the Jersey standard (•), the growth of the calf on the right is notably stagnant.

How can you measure?



Just by using a ruler, you can mark the graduation.



You check the height just horizontally maybe by using a stick





As shown in GR No.6, calf growth checking could be combined with the crush making!

Also, a <u>handy stick type</u> could be possible!



How can you check the data?

[Jersey and Friesian Standards: ft / cm]

Months	Jersey	Friesian	
1	2.4 / 74	2.7 / 83	-
2	2.6 / 80	2.9 / 91	1
3	2.8 / 84	3.1 / 95	
4	2.9 / 88	3.2 / 100	
5	3.0 / 93	3.4 / 104	(
6	3.1 / 95	3.6 / 108	
7	3.2 / 100	3.6 / 111	Ī
8	3.3 / 102	3.7 / 113	'
9	3.4 / 103	3.8 / 117	
10	3.5 / 105	3.9 / 119	١
11	3.5 / 106	3.9 / 120	
12	3.6 / 108	4.0 / 122	٦
13	3.6 / 111	4.1 / 127	
14	3.7 / 115	4.2 / 129	ł
15	3.8 / 116	4.3 / 130	
16	3.9 / 118	4.3 / 132	J

We recommend farmers as follows: To fix a date to take the measurement. For instance, **the first day of each month**.

Then farmers can compare them with the standard of various breeds, for instance, <u>Jersey</u> and <u>Friesian</u> as shown on the left, or maybe other breeds which look more or less alike to your cows.

If the figures are comparable to some of them, then, your calves or heifers are growing well!

[Important] As shown in the earlier page in this **GR No. 8**, in the case of Jersey and Friesian calves, they can be inseminated (AI-ed) or mated when they are in this range of wither height. As to Indian type breeds, the ranges would be more or less between these two breeds.

No.9

Check cows before taking them in and out!

Takeaway messages:

Gather enough information before buying or selling to make a right decision.

General concept about this practice is...

Keep good cows in! and Bad ones Out!

To do so... what do we have to Check before buying?

- Appearance check
 Milk production records
 Reproductive records
- Clinical case history

Appearance check (Basically as we observe in <u>No. 7</u>)

Especially the following points:

- ✓ I-Coat (=hairy appearance): should be shiny and smooth not dirty nor dull
- ✓ II-<u>Gait (=a way of walking)</u>: Are they not walking slowly, or with difficulty?
- ✓ III-<u>Teeth</u>: by checking teeth, you can guess the age of cattle:



From birth to less than 1 year (calves)



At around 4 years



* Cappe

Animals approaching 3 years

Note the difference between <u>deciduous (milk) teeth</u> (*d*) and <u>permanent teeth</u> (*p*)

From G. W. Pope (1927)

- ✓ IV-<u>Udders</u>:
- ✓ V-<u>Teats</u>:



Milk production records

- ✓ Average daily production
- ✓ **Peak production** (at 2nd to 3rd month after calving)
- ✓ Length of lactation
- ✓ The ration the cows receives (The amount and the type of feedstuffs)

Reproductive records

- ✓ Method of Breeding (AI?, Natural? or both?)
 Here, if for AI, tame ones are much better
- Parity numbers and calving intervals
 (Or the last calving, then second to last, and the like)
- ✓ Average heat cycle
- ✓ Pregnancy status

Clinical case history

All the clinical cases
 General disorders, Reproductive failures, and Udder problems including Mastitis

- ✓ Vaccination, de-worming and check-up records
- ✓ Any other features the new owner should know about the animals

Examples of these above last three (3) points (Milk production, Reproductive records, and Clinical case history) are mentioned in the technique No. 19, so please refer

Now, What do we have to check before selling?

As you might imagine, when selling, points to be checked would be only a few. Farmers should check just few points as follows:

- ♦ General performance
- Pregnancy status
- In the case of male ones, if it could be used as a stud bull

To check these points, you can use the technique No. 19

Lastly, to have the following idea may be useful:

It is the ratio of <u>the number of **milking cows**</u> to <u>the total number of cows</u> of a herd (excluding calves, heifers, and bulls). Generally speaking, in the case of the specialized dairy herds, the ratio should be about <u>80%</u> while non specialized ones such as dual-purpose (milk and meat) herds would be <u>60% or less</u>.

A schematic image would be as follows based on a herd with **<u>10 cows</u>**:



No.10 Be aware of pregnancy check and due date!

Takeaway messages:

Knowing pregnancy status and due date of your cows, you can be ready for future!

Importance of Pregnancy check

Good dairy farming is, broadly speaking, based on the two pillars:

- ✓ Good production → A good amount of milk you get every day
- ✓ Good reproduction → A calving you get every year

So, farmers should be aware of whether or not their cows are pregnant.

Things farmers can do to check pregnancy...

- ✓ Know the date of AI or breeding,
- ✓ Then, every 3 weeks (21 days*), with a range of 3 to 5 days, check the cow if she shows any heat signs (See No. 7 and 19), (*Basic heat cycle)
- And keep checking so, then, if the cow shows no signs again, meaning that the cow could be pregnant.
 (this method of preg-check is called "<u>no-return</u>" method because you are just checking whether the AI-ed cow returns to heat again or not)
- ✓ so, now he or she should ask their VS to perform a pregnancy check.

Also, nowadays some preg check kit by using milk is available. So farmers should be informed!

How to calculate due date?

Although Gestation length varies by breed, for most breeds **280 days** (with a range of 279 to 287 days) would be common.

Thus, to calculate due date, you have to add this to the date of AI or breeding. Here, the point is **280 days** are, roughly speaking*, **9 months** and **7 days**. So, you will these numbers to the date of AI.

An easy way to do so is as follows:

*Depending on the days of a given month (28, 29, 30 or 31), the total varies.

Supposing that your cow was AI-ed on <u>15 February (2)</u>... → First you <u>add 9</u> to the number of the month which is <u>2</u>, then → <u>Add 7</u> to the number of the day which is <u>15</u>.



Thus, the due date is: **22 November**

Now how about this. This could be a little tricky...

Supposing that your cow was AI-ed on **<u>15 August (8)</u>**...

First, as we learnt, you add 9 to the number of the month which is 8.

> Then, add 7 to the number of the day which is 15.



Here, the number <u>17</u> should be considered as <u>12* + 5</u> meaning that the month of the due date will be <u>5</u> (<u>May</u>). (*<u>12</u> means December, so, <u>13</u> is January, <u>14</u> is February, and the like)

Alternatively, when the number of the month of AI is greater than <u>4</u> like August (=From April to December), you can get the month of the due date just by <u>subtracting 3</u> from the month of AI;

8 - 3=<u>5</u> May

One more a tricky case here...

Supposing that your cow was AI-ed on <u>28 March (3)</u>...
➢ Again, as we learnt, you <u>add 9</u> to the number of the month which is <u>3</u>.
➢ Then, <u>add 7</u> to the number of the day which is <u>28</u>.



Thus, the due date is: **35 December?**

Here, the number <u>35</u> should be considered as $\underline{30^* + 5}$ meaning that the date of the due date will be <u>5</u> of the next month, so in this case, instead of **December**, it should be **January**. (*<u>30</u> means the representative number of days of one month)

So, the due date would be:

Thus, the due date is: 5 January

No.11 **Do not let your calf stay all the time with its mother!**

Takeaway messages:

A cow with her calf all the time tends to have more difficulty in returning to heat

The point we should explain well to farmers is that cows with calves all the time show most unsuccessful data in reproduction.



As you can see above, cows with calves occasionally (=restricted suckling) show better reproductive performance. Here, obviously cows without calves show the best performance but this practice can be applied only to pure European breeds which is not the case in the great majority of the farmers in NP.

A type of handling of calves <u>occasionally separating</u> from its mother is called: **Restricted suckling**

So, how to separate calves from cows?

Actually, there are so many farmers who, consciously or unconsciously, practice **Restricted Suckling**. A typical method is as follows:

Let the calf suckle its mother just before milking for <u>less than 1 min</u> for milk letdown

- ◆Tie the calf up near the mother
- Milk the mother cow
- Let the calf suckle again for <u>30 to 45 min</u>
- Separate the calf totally out of sight of the mother until next milking



Restricted suckling at a core farm

Other advantages of Restricted Suckling are...

"The saliva sealing" of calves in terms of prevention of mastitis: In the great majority of the cases, mastitis incidence was reduced to minimum levels when cows were managed under a restricted suckling system*.

The maintenance of <u>the bond between mother cows and their</u> <u>own calves</u>:

This is a very positive practice from an Animal Welfare viewpoint. A psychological bond between cow and calf when the cow was suckled by just her own calf was proven**.

^{*}Ugarte, J and Preston, T. R. (1975). Restricted suckling. 6. Effects on milk production, reproductive performance and incidence of clinical mastitis throughout the lactation. *Cuban Journal of Agricultural Science* **9**: 15-26.

^{**}Margerison, J. K., Preston, T. R., and C. J. C. Phillips, C. J. P. (2002). Restricted suckling of tropical dairy cows by their own calf or other cows' calves. *Journal Animal Science* **80**: 1663–1670.

No.12 Be selective about your breeding!

Takeaway messages:

By using a proper breed and a genetically good bull, you can improve your herd!





Concerning some issues in the previous page, let's take a close look!

✓ European inheritance

- Generally speaking, where cattle management is good, the performance (=milk production) of cross-breds increases with the level of European blood (=inheritance), such as Jersey or Holstein-Friesian.
- The cows that have 50 or 75 % of European inheritance perform better than all other levels.
- So, avoid applying a European straw to cows whose mother as well as • grand-mother are European breeds or they are not European cows but if both their mother and grand-mother were inseminated with European breeds.
- In such a case, try to use a Indian breed or local breeds, after which a • European breed can go again (reciprocal backcross See next page!).

✓ European inheritance (Cont'd)

Here, let's see how to avoid excessive upgrading (more than 75%) of European inheritance.



(II) Now, if this 50:50 offspring (Cow B) was inseminated again with European bulls, the upgrade level would be 75%

(IV) So, as you can imagine, if you put again an European straw to this 25:75 offspring, then the upgrade level would be higher than 75%!! Thus, now is the time to stop using European bulls by switching it with Indian bulls. Then, again, you can use a European straw to a daughter of Cow C, after which you will be using European and Indian types alternately (called reciprocal backcross)

[Important] As a rule of thumb, you can recommend farmers as follows: Never use more than 3 times successively Pure European Breed Bulls such as Jersey or Friesian to cows or heifers of the same lineage, meaning that as mentioned in the previous page, cows or heifers whose mother as well as grand-mother are inseminated with European breeds. Cows A, B and C shown in the figure are the epitome of the case. Therefore, you can AI European straws how manty times you want to, for instance, Cow A or B, but never to Cow C!

✓ In-breeding

- The mating of animals that are more closely related than the average of the breed.
- The most typical case a farmer as well as LDIs should avoid is a <u>Father vs Daughter mating</u> as follows (+):



✓ Dystocia due to AI

Though genetically good bulls, do not use large breeds for smaller cows or heifers. Because this may easily cause dystocia! But, please be aware of the negative connotation of this. You should explain very carefully this fact to farmers so that they do not get wrong ideas about AI, and they can take advantage of AI fully by avoiding dystocia.



Lastly, let's see the importance of the bull in the breeding scheme through AI

- In most <u>Dairy Industry</u>, the <u>Impact</u> from Bulls on Genetic Improvement is <u>much higher than</u> the Impact from Cows
- This may sound strange because all the sexually reproduced animals, including us, humans, receive exactly the half of genes from the mother and the other half from the father
- So, let's take a look at the following figure, then you will see the reason

Scene I: In some, maybe imaginary situations, where male and female populations are comparable, influences from Mother and Father could be 50% and 50%.



Scene II: In somehow organized situations, where just few bulls are used for breeding purpose. Is the influence still the same (50% and 50%)?



There are 15 cows and just 2 Bulls there !

Scene III: Now in totally organized situations, where Breeding is done exclusively by AI. So, all the cows totally depend on the Bulls of AI center.



So, if the AI center does not provide with good bulls, the cows and farmers will be "Victims"!! That's why the stud bull is very important!

Further information on some representative Indian breeds. Since our project is introducing the following two Indian dairy breeds, some basic traits of them will be given:

[Sahiwal] Their color can range from reddish brown through to the more predominant red.

It is tick-resistant, heat-tolerant and noted for its high resistance to parasites, both internal and external. Cows average 2,270kg of milk during a lactation while suckling a calf and much higher milk yields have been recorded. They are generally docile, making them more useful for slow work.

The Sahiwal is the heaviest milker of all Indian breeds and display a well developed udder. Sahiwals demonstrate the ability to sire small, fast-growing calves and are noted for their hardiness under unfavorable climatic conditions. (source: https://www.thecattlesite.com/breeds/dairy/96/sahiwal/)

[Girolando] Its looks comes from the Holstein and the Gir, it can be black and white in color. Female Girolando have physiological and morphological characteristics perfect for the milk production in the tropics.

Girolandos start producing calves at around 30 months, the peak of milk production is at 10 years and they can keep on producing till about 15 years. The interval between births is around 410 days. The average production of milk per lactation is 3,600 kg in 305 days, with 4% fat.

They have adaptability such as efficient foraging, resistance to diseases and pests. (source: https://www.thecattlesite.com/breeds/dairy/73/girolando/)





Here, just before finishing this subject, we will show you some more <u>slides</u> which VS technicians, both VSs and LDIs may find very useful when they shall introduce the AI technique to beginners, especially small scale dairy farmers who have no knowledge about AI. Thus, please use the following slides as such

What is Artificial Insemination (AI) of cattle?

Artificial insemination (AI) is to introduce sperm by using some tools commonly called AI gun into a heifer's or cow's reproductive organs, namely, cervix or uterine cavity for the purpose of achieving a pregnancy.

Thus, AI is done NOT by means of natural breeding but by a person such as AI technicians, or veterinarians, and that's why we call it "artificial insemination".

This is one of the most common practices in animal breeding, especially dairy cattle.

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What are the advantages of AI?

- ✓ The use of AI makes it possible to increase the number of calves from a good bull. This could be done by dividing the semen for multiple services. By natural services, a bull can be bred to 50 to 60 per year. Instead, by AI, thousands of cows can be mated per year by one bull.
- ✓As long as you use semen from good bulls such as proven bulls, or bulls with good inheritance, you can accelerate the rate of genetic improvement.
- ✓The mating of cows over a wide geographical area becomes possible. Also, you can use semen of a good bull that is in India or even in Japan through Al!.
- ✓Nowadays, the great majority of AI practice are done by using frozen semen straws which are stored in liquid nitrogen (LN2) tanks, and by using LN2 you can maintain straws almost permanently.
- ✓ It can help in preventing the spread of contagious diseases.
- ✓ Farmers do not have the problem of keeping bulls in their own herds.

What are the difficulties of AI?

- ✓AI has a cost. (Farmers may think that natural breeding would be better because as long as you use your own bull, you don't have to pay. But if a famer really wants to improve his/her herd, for sure AI will pay dividends).
- ✓ Heat detection would be a new and challenging duty, especially for farmers. AI will never be successful if done at an inappropriate time. Thus, farmers, together with LDIs or AI technicians, should be aware of this point, and have to know when to inform them of the heat and when to be AI-ed.
- ✓ In sites for AI performance, most probably in dairy farms, there should be basic conditions, above all, a crush, by which a cow for AI can be restrained properly.
- ✓Although AI is highly effective in improving animal's productivity, there is also a concern that its inappropriate use can lead to increased rates of genetic erosion and occasionally breed extinction. Also, the repetitive use of the best males results in strong increase in inbreeding such as father-daughter mating.

So, for some farmers, especially both extensive and semi-extensive farmers, it would be practical to combine natural breeding and AI methods together.

At any rates, if you think about introducing Al for your herd or if you need more information about Al, please contact the nearest VS, then we will give you further details based on your request!

No.13

Dry off your cows properly!

Takeaway messages:

Cows should be dried before calving to rest and to give fresh udder tissue enough time to get ready for lactation

First, let's see the effects of the length of <u>Days off</u> and <u>Production</u> and then show them to dairy famers!

As the *Takeaway message* says, drying off your cows before calving is important to allow udder tissue to repair

Lessons we should learn from the figure on the right are....

- Giving your cows a dry-off period of <u>60 days</u>, you may get more production
- It seems at least <u>40 days</u> are necessary for Dry-off
- However, if you give <u>a longer</u> <u>period of dry-off</u>, it would be counter-productive



Now, to dry off <u>When</u> and <u>How to do</u>?

To know When...

- ✓ First of all, you have to know the due date as explained in <u>No.10</u>
- ✓ Then, you will decide how many days you allow to dry
- According to the information in temperate zones, it ranges <u>between 45</u> and 60 days, depending on the production:
 - Cows with higher production ($\geq 20 \text{ L/d}$) = 55 to 60 days
 - □ Cows with lower production = <u>45 days</u> would be enough
- ✓ However, in the case of the first calving animals (primiparous), better give a longer period (<u>80 to 90 days</u>)

To know <u>How to do</u>...

- ✓ There are two types of dry-off methods:
 - Abrupt cessation: Cows are milked as usual right up to the last milking. In general, as long as the production is less than 12 L/d, this method is much better.
 - Gradual cessation: Some milkings are missed in the period before drying off. Cows will be milked, maybe, once every other day or third day (this was usual in the past).

Then,

Reduce the nutrition level to the maintenance for 3 to 4 days prior to dry off as shown below. This is an example for 56 days of dry-off period. Now, let's suppose that a cow's due date is June 28. So, 56 days (=8 weeks) before the due date would be May 3 (by using a calendar you can find the date easily!).

Dry-off day (May 3)			Dry-off period=56 days (=8weeks)					Due date (June 28)		
	-9 weeks	-8 weeks	-7 weeks	-6 weeks	-5 weeks	-4 weeks	-3 weeks	-2 weeks	-1 week	1 week~
♦ Fibers	As usual		Ad libitum, especially quality hay would be ideal A							
♦ Grains or high energy	days 5 4 3	FYI: the pe parturition i most critica	riod between s called as <u>tra</u> l physiologica	3 weeks both ansition perio al stage!	before and af <u>od</u> , which is o	ter ne of the	0.5~1.0 kg	1.0~1.5 kg	1.5~2.0 kg	Postpartum
teedstuffs		0~0.5 kg of grains or high energy feedstuffs								

Drop down the grain feeding levels <u>gradually</u> to the maintenance level for 3 to 4 days before the day to start dry-off. This should be made, we repeat!, <u>gradually</u>!

Then, as shown above, 3 weeks before the due date, again, the grain feeding level should be started increasing gradually so that in 1 month after calving, it reaches the "appropriate*" amount for a given cow (*See No. 1).

On top of those points mentioned above, when possible, try to change the cow's environment so she is away from the sights as well as sounds of milking.

No.14

Follow the standardized animal health program!

Takeaway messages:

Prevention is better than cure. Keeping your cows healthy guarantees you healthy economy as well!

Here, let's think about Animal Health!

Animal health, in its correct sense, deals with almost all the aspects of animal-keeping such as **Managing**, **Feeding**, **Housing**, **Disease** and even **Behavior**. Health is, equal to our case, based on a combination of many and different factors, to which all the GRs of this manual are linked inextricably. This somehow complicated nature of health, first of all, should be taught to farmers as well, and that is our role.

On the other hand, also important is that we should know that, in practice, the term of Animal health is often applied to issues about diseases, especially infectious ones. It is true that the disease issue is, by definition, one of the most important determinants of animal health.

Thus, this **GR No.14** will focus on how to prevent infectious diseases, especially highly contagious or fatal ones such as FMD, BQ or HS. Also, some other important points are mentioned including side-effects of vaccines and how to use prescribed medicines.

As **Takeaway message** says, a majority of practices shown here are for prevention. Preventive measures as well as some important points we should take and be aware of are as follows:

♦<u>Vaccines</u>:

- ✓ What vaccine should be recommended?
- ✓ When or in which month should be vaccinated?
- ✓ Do vaccines cause any negative effects?

De-worming:

- ✓ When should be administrated?
- ✓ Is one administration of de-worming cure-all?

Check-ups (diagnosis):

- ✓ What should be checked and when?
- ✓ What samples should be collected?



✓ What vaccine should be recommended?

Among others, most VSOs offer the following 3 vaccines free of charge: FMD, BQ and HS. This is because an outbreak of these infectious diseases may **become widespread**, for instance, across the country or a province, or may **cause great loss** of livestock. This makes a big difference to other minor or sporadic infectious diseases such as mastitis or helminthiasis (parasite). Some important features are given in the table below:

Attributes	FMD	BQ	HS
Causal agents	Virus	Bacteria	Bacteria
Progress	Acute	Highly acute	Highly acute
Spread of disease	Very rapid	Localized	Moderate
Mortality	Rather low	Highly fatal	Highly fatal
Endemism (province-wise)	Nation-wide	<mark>N</mark> , NC, E, NW	N, NC, E
OIE listed disease	А		В

When or in which month should be vaccinated?
 The timing of vaccination should be determined by considering a series of points as shown below:

- <u>Seasonality in occurrence</u>: while FMD may occur throughout the year, BQ and HS show some seasonality. For instance, BQ usually occurs in summer and animals become more susceptible to HS at the beginning of the rainy season.
- Yala and Maha: in NP, a great majority of dairy farmers work as paddy growers as well. So, both rice planting and harvest seasons are busy periods. Also important is that some livestock farmers, especially extensive farmers practice transhumance in which a great number of cattle move from a place to another occasionally causing inadvertent spread of causal agents.
- **Excavation sites**: it is said that outbreaks of BQ are common on farms or grazing sites in which recent excavations have occurred (disturbance of soil may activate causal dormant bacteria called "spores").
- <u>Availability of vaccines</u>: Not that necessary amounts of vaccine stocks are always available. Vaccinators should be aware of that and therefore careful prioritization of the distribution of available vaccines would be a must

✓ Do vaccines cause any negative effects?

The answer to this question would be "**Yes and No**". Because depending on the type of vaccines, they may cause a serious problem such as abortion. One of the most recognized cases as such would be IBR* live vaccine administration. In Sri Lanka, however, since IBR vaccine is not in common use, and any of already recommended vaccines (FMD, BQ, and HS) are NOT in the abortion-causing-vaccine list, there are no worries for farmers as well as vaccinators about using them for pregnant cows.

Nevertheless, there might be a case in which not the vaccine itself but stresses caused by the handling provoke abortion, especially in the following situations:

✓ In a herd of extensive farmers: Animals are not regularly handled so they get easily stressed or panicked ✓ <u>Giving two doses at one stroke</u>: The more vaccines and treatment, obviously, the more stress

Therefore, it should be a must for us animal technicians to <u>explain completely these facts to our farmers</u> so that we could avoid unreasonable complaints from farmers!

*Infectious Bovine Rhinotracheitis

•<u>De-worming</u>:

✓ When should be administrated?

In Sri Lanka, the timing of de-worming is recommended by VSs as follows:



•: the timing of administration

Here, also important is that to obtain drugs for de-worming (parasiticide) a farmer needs a prescription given by a VS. Then, as shown later, farmers as prescription drug users, they have to comply with instructions of the drug, including appropriate <u>doses</u>: the amount of drugs to be given should be calculated according to the body weight of each animal to which a farmer will administer.

Warning: Unless farmers insist, pregnant animals should be de-wormed as explained in the previous page

✓ Is one administration of de-worming cure-all?

Actually, this is not always the case. Although we hear and use often the phrase: **de-worming**, and some instructions may say "kill all the types of internal worms in the cattle", it all depends on how a given drug behaves through the body and also how a cow reacts to the drug. The parasiticides shown in the photos below are all available in veterinary pharmacies in NP, and, although the great majority of them target a broad spectrum of species as well as stages, some of them do only limited activities.

Thus, it is important for us to be aware of this fact, especially **when you evaluate the effects of medication** if animals administrated are responsive or not to the drug you used. Then, keep the records such as which drug was effective against what kind of worms or symptoms (See No.19).



Check-ups (diagnosis):

✓ What should be checked and when?

Among others, three of the most commonly practiced check-ups in NP are: 1) <u>CMT</u> for mastitis, 2) <u>MRT</u> for brucellosis, and 3) <u>Fecal test</u>. They are all available in VIC through VSs or by visiting in person. The check-ups should be done when a famer find abnormal signs. During fore-milking, if flakes, clots or seruous milk are observed, ask for CMT test, and if a cow, apparently in good health, aborts suddenly especially between the fifth and seventh month of gestation, ask for MRT. Also important is that brucellosis is one of the major <u>zoonotic</u> <u>diseases</u> which means it is transmissible from animals to humans, in this case, causing fever, weakness, weight loss, etc. Together with <u>Tuberculosis</u>, these two diseases could be infected through consumption of raw milk or not heated dairy products coming from infected cows. That's why the check-ups are so important! Lastly, if you see some strange symptoms, for instance, a cow eats well but so skinny, ask for fecal test.

✓ What samples should be collected? CMT and MRT checks need <u>raw milk</u>. Test milk must be freshly stripped and satisfactory in quality. Spoiled or unclear milk should be avoided, and find a clean container to bring the sample. Unclean samples may produce results that cannot be interpreted correctly. For fecal test, some amount of <u>fresh feces</u> is necessary. Famers who want to do should take a sample in a clean plastic bag, and send it as soon as possible.



CMT (California Mastitis Test)

MRT(Milk Ring Test)

Additionally, we should show famers that they have to comply with the instructions of drugs, especially antibiotics, when treated with them. Points are as follows:

What is the withdrawal period?

The minimum period of time (days) from administering the last dose of medication such as antibiotics or parasiticides, during which the delivery of production (=milk or meat) will be suspended (withdrawn).

How many days do we have to stop shipping milk?

Normally 4 to 5 days, but farmers should check the Instruction which comes with the drug they use

And Why?

Two main reasons could be mentioned here:

- ◆ Industrial loss: Interference in the manufacture of cultured milk products.
- Animal and Public health concern: Development of antimicrobial-resistant bacteria



Adding some more important points...

As mentioned at the beginning of this GR No.14, **Good health** of cows is truly based on the complex interaction between individual animals and their environment. Any disturbance to this state of equilibrium can produce stress which may lead to bad health thereby making them more and more vulnerable to diseases, especially, infectious ones.

Thus, not only taking preventive measures as we mentioned above, but also trying to keep your cows always in good conditions, i.e.; proper feeding, clean water, simple but comfortable housing, should be always kept in mind.

Lastly, please do not forget to do the following:

- ✓ Keep all the records of vaccinations, de-worming, and check-ups! (See No.19)
- ✓ Notify as soon as possible to the VS if you find any unusual cases such as a sudden and unexpected increase in the incidence, morbidity, mortality or unprecedented cases such as Lumpy Skin Disease (LSD) both in your farm and your region.

No.15

Milk more than once a day!

Takeaway messages:

Do you believe, "If you milk twice, you will get less milk the following day"? This is not true. Please remember It's wrong!

The most important point farmers should know is that:

- Not necessarily that farmers should milk twice a day and sell it.
- Rather, farmers should know that by doing so, they can bring out <u>the milking potential their cows have</u> more noticeably



E. J. De Peters, et al. (1985).

[Advantages]

- More production by stimulating mammary glands
- ✓ Longer lactation
- ✓ Higher milk fat content

[Disadvantages]

- More stress for cows
- More work for farmers

Please remember that milking more than twice has its intrinsic negative points as well.

How to milk and how to use it:

[How to milk]

Milk as usual

• Let a calf to suckle (See No. 7)

[How to use]

- Sell as usual
- Sell to neighbors
- Make some dairy products

Warning:

✓ Do not practice this on cows whose body condition is extremely low.

✓ Do not practice this on cows whose Indian inheritance level is obviously high.

No.16

Be selective about your milking utensils and keep them always clean and dry!

Takeaway messages:

Inappropriate utensils, though easy to handle, and leaving them unclean and wet, your harvested milk will be spoiled! First, we should recognize well the difference between <u>inappropriate</u> and <u>appropriate</u> utensils and show them to farmers!

[Milk cans for shipment]



These containers, recycled ones, are easy to find as well as handle, but it's <u>inappropriate</u> because it is difficult to wash completely



This could be a bit expensive, but <u>appropriate</u> because it's easy to wash and lasts longer!

Now, we will see the difference between <u>Clean</u> and <u>Dry</u> and <u>Dirty & Wet</u> containers!

[Milking pots]



These pots are all easy to wash completely (wide-mouth), and look like "clean" <u>but</u>...



Almost no bacteria

<u>Photo I</u>: This is a sample of Bacteria Count directly from a quarter. Note that just a few colonies are there!



A lot of bacteria!!

<u>Photo II</u>: This is another, immediately after milking, but once harvested in a milking pot which was NOT hygienic.



All in all, recommendations about utensils would be that:

- Should be <u>wide-mouth</u> containers which are easy to wash,
- Should be <u>washed well</u> as soon as after milking or shipping,
- Should be **dried completely**.

□ How can we wash well?

- ✓ Try to wash immediately after the use
- ✓ By using a sponge or a brush
- ✓ Preferably by using hot or lukewarm water
- Preferably by using detergents (dishwashing detergents are enough)
- ✓ Finally by rinsing well

When you use a detergent, please be aware about the recommended concentration! For instance, in the case of *Teepol*, <u>a ratio of 1:40</u> would be fine. This means, you will mix one plastic-bottle cap of *Teepol* (about 5cc) with one mug cap of water (about 200cc). Then, you will scrub your milking utensils with a brush dipping it into this mixed solution!

□ How can we <u>dry out completely</u> after washing?

- ✓ Tyr to leave utensils upside down
- ✓ By using a rack or other tools
- ✓ Preferably by placing in the sun

A structure for drying milk cans





A simple tool



Plastic bottle



A dryng rack for milk cans



By hanging

By using a hole and a nail, you can hang a milk can

Concerning the type of utensils for milking or delivery, basically speaking, we are advocates of eliminating the use of **<u>plastic bottles</u>**. However, considering the fact that the great majority of dairymen use it on a daily basis, we also think the idea would NOT be realistic.

Therefore, at least, we would like to recommend farmers using pet bottles:

• To wash and dry it thoroughly as mentioned above, and,

 To keep replacing it with a new one before getting visibly worn out
No.17 Keep your milk and milking environment always clean!

Takeaway messages:

Just by washing your hands and keeping teats clean, tying the tail, and filtering milk you can improve your milk quality!

Here the point is that Keeping all the utensils <u>clean</u> does not mean your milk is necessarily <u>clean</u>!

To take advantage of your clean utensils, please be aware of the following:

Our hands could be a breeding ground for germs even after "<u>washing</u>" if water is not clean

The body of cows is exactly a breeding ground for germs, especially when soiled with manure.

Milking environments are, in general, full of dirt:

Soil, Dust, Mud, Dung, Urine, Bugs, Hair, etc.

Our hands could be a breeding ground for germs even after "<u>washing</u>" if water is not clean.

Let's see some examples!



You should wash your hands with running water and, ideally, with soap before milking

The body of cows is exactly a breeding ground for germs, especially when soiled with manure.

Let's see some examples!



A commonly observed cow's body: partially covered in manure



But, as long as teats and udders are visibly clean, you can start milking as it is.



If teats or udders are dirty, wash and clean, and dry them up!



Try to wash in a localized manner (do not wash the whole body)

Dirty water may drip into the milking pot!

Here, please do not forget to check "fore-milk" by pouring some: the presence of flakes, clots or watery milk.

[Message] By doing so, you can keep milk cleaner and prevent udder infections! The body of cows is exactly a breeding ground for germs, especially when soiled with manure. *~Cont'd~*

Let's see other examples!

In the case of cows that are <u>NOT</u> <u>tame</u> or <u>nervous</u>, maybe you can consider the following for milking:

- The crush as shown in No. 6
- A rope to tie the tail up during milking.



[Message] By doing so, you can **<u>keep harvested milk cleaner</u>**! Also, when affordable, famers may as well remake a <u>concrete floor</u> for the milking site instead of the earthen one as shown in the photo!

Then, just before milking try to observe well udders, teats, and milk (fore-milk):

This practice too should be part of the clean milking.

- ✓ Udders: Growing hard? Attachment, Dirtiness, etc.
- ✓ **Teats**: Color, Dirtiness, etc.
- ✓ Fore-milk: Farmers should discard a few streams of milk from the teat (fore-milk). At this moment, they should check whether or not some abnormalities are found, such as Clots, Flakes, or Watery milk. If identified, farmers should not pour the

harvested milk into milking pots (abnormal milk be discarded, and try to milk such a cow last). Ideally, fore-milk checking should be done by using a strip cup or a cup-like item^{*}.

*Here, the point is that it would be best NOT to strip fore-milk down to the floor directly. Because if the cow with abnormal fore-milk is infected with mastitis, then spilt fore-milk may be an infectious agent



A strip cup

Milking environments are in general full of dirt:
Soil, Dust, Mud, Dung, Urine, Bugs, Hair, etc.

Let's see how to avoid dirt!



In harvested milk containers, you can find dirt in any shape or form!



When transferring milk into the container for shipment, filter it by using a <u>strainer</u> or <u>other</u> <u>easy-to-find materials like gauze</u>!

A lot of pieces of debris!

[Message]

By doing so, you can **prevent foreign bodies** from entering into milk! And, please remember that **materials filters should be washed and dried!**

Lastly, concerning the hand-milking practice, <u>as long as mastitis is</u> <u>NOT frequently seen</u>, each farmer should go by following their traditional method, such as: <u>A sample of Coconut oil</u>:

The use of coconut oil for milking Here, we strongly recommend farmers to use <u>a lid</u> and, if it looks dirty, better once heat it up then let it stand until it cools

A sample of Coconut oil: A great majority of pots for coconut oil is lid-less and harbors a lot of germs



Without" dipping and the "saliva-sealing" by a calf We advocate that <u>the natural defense mechanisms</u> of local breeds are much stronger than those pure exotic types, which need dipping after milking. Also, <u>the saliva sealing protects cows from udder infection</u>.

In the case of cows with a history of frequent mastitis, they might be treated differently.

Some more tips for cows with a history of mastitis:



Again some more tips about mastitis for heifers:

Did you know that even heifers may get infected with mastitis?

The thing is that Mastitis is not a problem of cows only but also of heifers. Be it, non-bred or pregnant, they may suffer from mastitis. Although in NP it is not common, there could always be a possibility. Thus, the following control and prevention methods should be practiced at the farm level:

- Avoidance of inter-sucking among young stock,
- Insects control, especially fly.
- Optimal nutrition, and
- Comfort measures, especially around calving.

No.18 Keep your milk in a cooler place and dispatch it as soon as possible!

Takeaway messages:

This is the first step to prevent germs in your harvested milk from growing!

Although you keep all the milking utensils <u>clean and dry</u>, and handle the harvested milk <u>in a sanitary manner</u>, milk may be "<u>dirty</u>"(=contaminated).

Why and when and how?

If you leave the harvested milk **without being cooled**, it may be spoiled because of the growth of bacteria. The thing is that:

- Even milk from a healthy cow may have some amounts of bacteria, and,
- In the case of milk contaminated as shown above, the growth rate will be much higher



Now, let's see How bacteria grow in harvested milk at different temperatures ~Contaminated raw milk with bacteria in the environment~



So, after milking, farmers should try:

- Not to make the milk temperature warmer, and,
- When possible, make the milk as cool as possible.

You can get it, by storing the harvested milk:

 \checkmark In the shade or in a cooler place,

✓ In running water,

(if you can get cooler water)

✓In a refrigerator



Also, by shipping the milk as soon as possible: ✓ At the latest, within 3 hours after milking.

Now, why we say "<u>3 hours</u>", let me ask you a question...

Have you ever heard *Natural Antimicrobial Systems** in Milk?

Raw milk, of course including cow milk, contains <u>natural</u> antimicrobial peptides or <u>enzymes</u> such as:

- Lactoferrin,
- Lactoperoxidase,
- Lysozyme, and,
- N-acetyl-beta-D-Glucosaminidase

Those natural substances prevent a significant increase of bacteria in milk within the first 3 to 4 hours after milking at environmental temperatures.



Time taken after milking and Bacteria growth at environmental temperatures

[Message] Even at environmental temperatures, if left in an aseptic condition, within the first 3 to 4 hours after milking, bacteria growth is minimum.

Elapsed time

Bacteria growth after milking at 0 hr, 1 hr, 2 hr, 3 hr, 4 hr, 5 hr, 6 hr, and 7 hr.



No.19 Keep basic records and make better use of it!

Takeaway messages:

Without information, you cannot make right decisions, nor can you give precise explanations to your VS, LDI or AI Tech

Who is the <u>Record-keeping</u> intended for?

For those who want to improve their dairy farming, for instance, one who:

- Wants to increase the milk production
- Wants to improve productivity: such as by reducing the number of cows but keeping the same amount of production.
- Wants to gain more profits ...

Those farmers, by definition, have to keep records.

Because without keeping records, they will never be able to tell

if they have increased the production, have improved productivity or have gained more profits!

What Records do we have to keep?

[Basic records] highly important for all aspects of dairy farming

Items	Remarks	Importance
♦ Farm register	By being registered as a livestock farm by VSO/P/DAPH	Very high
♦ Animal ID	By naming, numbering, checking colors, ear-tagging, etc.	Very high
◆ Date of birth	If from your own farm, calving date	High

[Production records]

Items	Remarks	Importance
Daily production*	By using a scale or a bucket with the mark	Very high
♦ Milk fat and SNF	By checking the data from your handler	Medium
Lactation length	See "Reproduction records"	Medium

* Not the amount you shipped to your MCP but you actually milked. And it says "<u>daily</u>" but not necessarily you have to measure every day. Maybe <u>once a week</u> or <u>once a month</u> would be sufficient

A spring scale



A bucket with graduated marks



What Records do we have to keep?

[Reproduction records]

Items	Remarks	Importance
Date of heat	Be aware of the heat cycle (21 days)	Very high
◆ Date of AI	Or the date of breeding	Very high
Pedigree data	Ask your LDI	Medium ³
Pregnancy check ¹	Record the date of check and its result	High
◆ Due date	See the practice No. 10	High
♦ Date of dry-off ²	See the practice No. 13	High
◆ Date of calving ²	Compare the date with the due date	Very high
♦ Abortion	Check if she repeats and at what months it occurred	High
♦ Dystocia	Check if she repeats and the breed AI-ed	Medium
Retained placenta	Check if she repeats	High

¹Be aware of the possibility of "**repeat breeder**". The cow AI-ed might be so if she does NOT get pregnant despite (at least three or more) consecutive AI. If this is the case, notify it to your VS!

²Counting from the last calving date to the date of dry-off, you can get "Lactation length".

³At least the No. of bull is a must.

What Records do we have to keep?

[Animal health] See practice No.14

Items	Remarks	Importance
♦ Vaccines	Mark the dates of vaccines you received: FMD, BQ, etc.	Very high
De-worming	Mark the dates, 1) the name of medicines you used, 2) the amount administered, 3) instructions of the drug, esp. against which type of worms it was made, then, 4) its efficacy (how good it was).	High
Check-ups	Record the name of check-ups (what it was for), and its result	High
Prescriptions	Check the instruction and be aware of the withdrawal period, if any.	High
♦ Others	Record all the treatments or operations your VS or LDI performed	High

What Records do we have to keep?

[Management]

Items	Remarks	Importance
♦ Concentrates	How much you give for each cowHow often you giveWhat kind of concentrate you give	Ideal or recommendable
♦ Fibers	How much fibers you giveWhat kind of fibers you give	Ideal or recommendable
Supplements	How much supplement you giveWhat kind of supplement you give	Ideal or recommendable
♦ Others	How much of special feedstuffs you prepared such as silage, if any.When you prepared	Ideal or recommendable

How do we keep Records?

There are so many types of methods and materials for keeping records. The following ones are most common and, by using one of them, maybe farmers can keep all the necessary records:



But, covering all the items mentioned above would require a lot of attention and efforts, especially for those who think about starting to do now.

So, to start with, <u>a calendar</u> would be a good idea, and that's why the project distributed an originally designed calendar.

Because...



Then, at least the following items should be kept!

Prod	uction	Reproduction		Animal health		Management	
Daily produ	uction	Date of Hea	at	Vaccines		Concentrate amount	
Buyings (S	ee No. 20)	Date of AI		De-worming	g	Fiber amount	
	mulal	Due date				Grass harve	est
An exa	mpiei	Date of cal	ving				
Mon	Tue	Wed	Thu	Fri	Sat	Sun	14/Mar
		1	2 Kamathenu : Calving	3	4 Vella: Al	5	-Sivappi=12L -Vella=6L
6 Komatha: Heat	7	8	9	10	11 ^{1st} week post Al	12	28/Mar -Komatha=9L
13	14	15 Sivappi: Al*	16	17	18 2 nd week post Al	19	-Sivappi=14L -Vella=5L
20	21 ^{Bought} a 25kg feed bag	22	23	24	25 ^{3rd week} post Al To check heat sign!	26 Vella: Heat	Concentrate -Sivappi=2.5k
27 Komatha: Al*	28	29 1 st cutting : CO5	30	31 Vaccine: FMD*			-Koma, Vella=1k

*These types of information could be written down by operators themselves (VSs, LDIs, etc.).

Then, especially, concerning the parameters about **Production** and **Reproduction**, please try to check the following points:

- ✓ [**Production**] Lactation curve: if the milk production reaches its peak
- ✓ [Reproduction I] How many days does it take a cow to get on heat again after calving? (See No.11)
- [Reproduction II] How many AI services does a cow need to get pregnant?
- [Reproduction III] How many months does a heifer need to show the 1st heat? (to be AI-ed for the first time)



Then, concerning <u>the reproduction</u>, The following could be our target!

Parameters	Desired Values		
Al after Calving:	No later than 3 months		
Numbers of AI:	Up to 4 times		
1 st AI for Heifers:	Between 18 and 24 months (less than 2 years)		

Thus, by making comparisons between these targets and your records, you are truly **using your data**, and you can <u>make decisions</u> based on that! This is very positive because <u>keeping full records just for the</u> <u>sake of keeping them is a waste of time and energy</u>.

Lastly, let's learn one more positive thing about this practice. By keeping records, <u>you can get</u>:

Not only exact information about your own cows to make decisions...

But also more useful services from VSs and LDIs since now you could show them more precise information.

[One last message!!] Please do not throw <u>the pages</u> away! Keep your calendars at least for three to four years!!

No.20

Check the account of your dairy farming!

Takeaway messages:

Although you have so many cows with good production, if you don't know how much you earn, you may be wasting!

The message from this practice is very easy:

To know whether your dairy faming is <u>profitable or not</u>, you should do the accounts. It means that:

- ✓ You check how much you earn (a), say, a month
- ✓ And you also check <u>how much you spend</u> (*b*),
- \checkmark Then, you will subtract (*b*) from (*a*)
- ✓ Now, if the answer is **positive**, it's profitable!
- ✓ But the answer is <u>negative</u>, you are losing!

Let's check how much you get and spend!

Firstly, items you may put in the tables...



One example you may have...

How much you get			How mu	ch you s	pend
From milk		40,000 Rs.	Feedstuffs		45,000 Rs.
Male calves			Health issues		15,000 Rs.
Dung		10,000 Rs.	AI		1,000 Rs.
Others			Others	fences	5,000 Rs.
Total		50,000 Rs.	Total		66,000 Rs.
					You are
		50,000-66,000= -16,000 losing!			

Another example you may have...



Also this could happen if you are a seasonal dairy man



Still another example you may have if you are a seasonal dairy man

How much you get			How much you spend		
From milk		0 Rs.	Feedstuffs		0 Rs.
Male calves			Health issues		0 Rs.
Dung			AI		0 Rs.
Others			Others		
Tota	l	0 Rs.	Total		0 Rs.
In this ca "No record"	se, is the				Slack
information to be kept for this month			0-0= 0		months

So, you should check all the monthly balances together!

How much you get			How m	uch you s	pend
January		30,000 Rs.	January		15,000 Rs.
February		28,000 Rs.	February		20,000 Rs.
March		45,000 Rs.	March		12,000 Rs.
April		0 Rs.	April		500 Rs.
~~~~~~			~~~~~~	~~~~~~~	~~~~~~~
November		0 Rs.	November		800 Rs.
December		25,000 Rs.	December		11,000 Rs.
Tot	al	220,000 Rs.	Total		150,000 Rs.
220,000-150,000 <b>= 70,00</b> 0					Profitable!

And, to facilitate the practices of **Record-keeping** (**No. 19**) and **Book-keeping** (**No. 20**), we should recommend all the farmers to keep necessary documents as well, such as:

Milk shipment record (from your milk handler)

- Receipts of feeds, drugs, vaccines, etc., and
- Al slips,
- And other documents related to book-keeping

# And, let's see how we can use <u>the account sheet</u> more efficiently...

One possible method would be a "Concentrate Feed efficiency" check

In the simplest terms, it is the kilograms of milk produced per kilogram of concentrates.

For instance, by using records of:

- Amount of concentrates you used, say, 1 bag (=25kg) (a), and,
- Milk production you got <u>during the</u> <u>period in which you used</u> one bag of concentrates (b).







This [ 2.2 ] would be, we say, a good sign. In general, [ >2.0 ] could be considered efficient. So, for instance, how about the following cases?



But anyway, this is just a rough calculation, and highly relative. Thus, please be aware of these points and always try to get related information such as:

✓ The number of milking cows,

- $\checkmark$  Individual production of each cow
- ✓ Quality of concentrates

Lastly, concerning how to explain all the GRs of this manual, especially, practices like GRs No.19 & 20, <u>good</u> <u>communication skills</u> are indispensable because verbal instructions are the main tool for technology transfer. Thus, photos, flip-charts, calendars, etc. as shown below, would be a useful complement to this activity!



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