

# RESEARCH REPORT

## OPTIMALISATION OF CAMARA SHIP UTILIZATION TO IMPROVE LIVE ANIMAL TRANSPORTATION SYSTEM

### FEED PRODUCTION FOR CATTLE DURING TRANSPORTATION USING CAMARA SHIPS

#### TEAMS:

DR. DESPAL, S.PT., M.SC.AGR.

PROF. DR. IR. YULI RETNANI, M.SC

DR. IR. IDAT GALIH PERMANA, M.SC.AGR.

DR. IR. HERI AHMAD SUKRIA, M.SC.AGR.

#### STUDENTS:

KANIA ASRI LIANY (S2 LOGISTIC)

NUR'AINI, SPT (S2 LOGISTIC)

FENSA EKA WIDJAYA (S3 INP)



# BACKGROUNDS

FAVORABLE CONDITIONS	LIMITING FACTORS	ALTERNATIVE SOLUTION
HIGH BEEF DEMAND	ARCHIPELAGO	CATTLE SEA TRANSPORTATION
ARABLE LAND	DISTANCE PRODUSER – CONSUMER	IMPROVEMENT FEEDS QUALITY AND FEEDING MANAGEMENT
FAVORABLE CLIMATE	COLD CHAIN	
FARMING CULTURE	INFRASTRUCTURE	
NATURAL GRASS LAND	LOW QUALITY FORAGE	
BY-PRODUCT/LEGUME		

# METHODS

IDENTI-  
FICATION

IMPROVE-  
MENT

LABORATORY  
TEST

SIMULATION  
TEST

ON SITE  
TEST

# Indonesia Cattle Ship Condition (Camara Nusantara)



## Feed in Cattle Ship during voyage

- Straw Rice Hay
- Low nutrient quality and digestibility
- Bulky (placed everywhere on cabin)
- Weight loss up to 12,6 %

Nutrient Content (%)	Feed Variety
	Hay
Dry Mater	85.23
Ash	12.67
Crude Protein	4.60
Crude Fat	5.29
Crude Fiber	30.2
Nitrogen Free Extract	47.24
TDN	56.6

## Storage condition

- Palka (Ship Storage) volume is 199,1 m<sup>3</sup>
- Useless
- If used for storing straw rice hay it can carry as much as 21,9 ton

Nutrient Content (%)	Crude Protein	TDN
NRC (1982)	11.5	65.2
MLA (2011)	10.5-12	59.62



The image features a dark green background with a subtle gradient. In the corners, there are decorative elements consisting of light green lines that resemble circuit traces or a stylized tree structure, ending in small circles. The word "RESULTS" is centered in the upper left quadrant in a white, bold, sans-serif font.

# RESULTS



# **Evaluation of Various Types Feed Quality and Feed Forms Efficiency for Sea Transportation**

**Dr Despal SPt, MScAgr**

**Prof Dr Ir Yuli Retnani, MSc**

**Kania Asri Liany**



## Research Procedure



Variety of feed:

1. Rice straw hay
2. Australia Pellet
3. Formulation Feed (Kearl 1982) from 40% rice straw and 60% concentrate contain of pollard, cassava piles, dried distillers grains with soluble (DDGS), copra, soy bean meal, coffee skin,  $\text{CaCO}_3$  and molasses.

Stage 1

Physical quality  
of various feed

Chemical  
quality of  
various feed

Stage 2

Physical quality  
of various form  
feed

Palatability

Storage  
Efficiency

➤ Nutrient Content, Digestibility, NH<sub>3</sub>, and VFA of various feed

Nutrient Content (%)	Feed Variety		
	Hay	Australia Pellet	Formulation Feed
Dry Mater	85.23	91.92	87.60
Ash	12.67	17.81	8.53
Crude Protein	3.92*	7.69	10.56
Crude Fat	3.43	1.79	2.41
Crude Fiber	25.74*	18.57	17.23
Nitrogen Free Extract	42.17	54.14	61.27
TDN	47.51	52.83	61.50

Variable	Feed Variety		
	Hay	Australia Pellet	Formulation Feed
In vitro dry matter digestibility (%)	42.81 ± 1.31c	63.47 ± 1.80b	73.83 ± 2.14a
In vitro organic matter digestibility (%)	36.02 ± 2.14c	54.64 ± 2.12b	71.93 ± 2.45a
NH <sub>3</sub> (gr/cm <sup>3</sup> )	6.43 ± 0.34b	7.36 ± 0.62b	8.46 ± 0.86a
VFA (gr/cm <sup>3</sup> )	101.21 ± 6.00b	113.73 ± 18.21ab	134.08 ± 22.62a

➤ The provision of hay has not been able to meet the adequacy of daily nutrient requirements of cattle, because of the low nutrient content and low digestibility

➤ Physical quality of various feed

Variable	Feed Variety		
	Hay	Australia Pellet	Formulation Feed
Moisture (%)	14.44 ± 1.90b	11.88 ± 0.70a	14.98 ± 1.85b
Water Absorption (%)	31.46 ± 4.03a	74.04 ± 5.46b	73.14 ± 3.30b
Stack density (gr/cm <sup>3</sup> )	0.08 ± 0.00c	0.51 ± 0.02a	0.15 ± 0.01b
Density (gr/cm <sup>3</sup> )	0.11 ± 0.01c	0.56 ± 0.02a	0.17 ± 0.01b
Water Activity	0.85 ± 0.01c	0.65 ± 0.03a	0.76 ± 0.03b

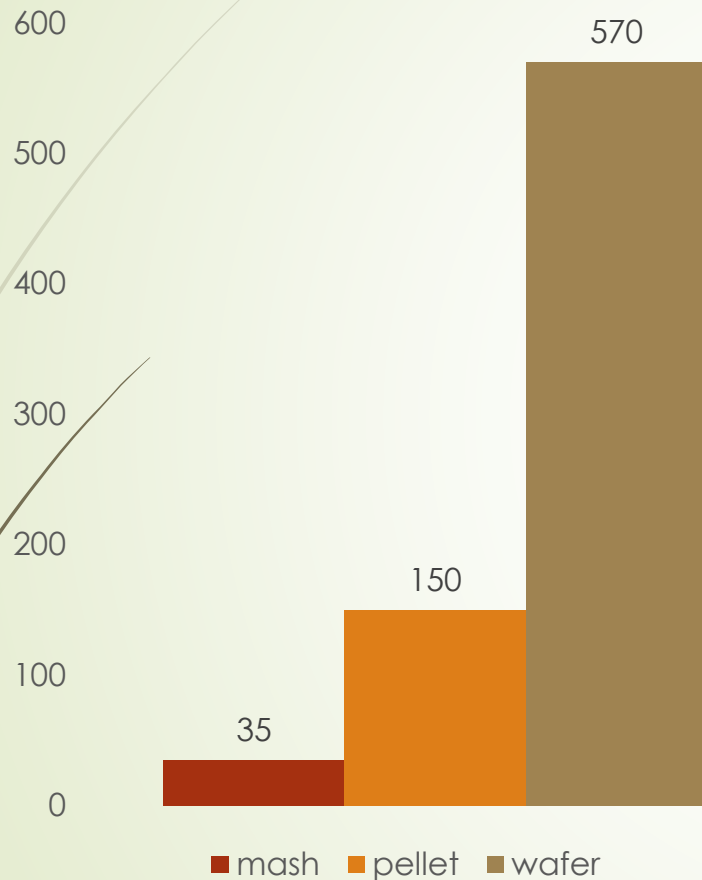
➤ Storage efficiency various form of formulated feed

Feed	Feed form	Density (kg/m <sup>3</sup> )	Carriage feed (ton)	Storage efficiency (%)
Formulation feed	Mash	170	33.8	20.4
	Pellet	450	89.6	70
	Wafer	180	35.84	24.9
Australia Feed	Mash	380	75.6	64.4
	Pellet	560	111.5	75,9
	Wafer	300	59.7	54.9
Hay	-	110	21.9	Not efficient

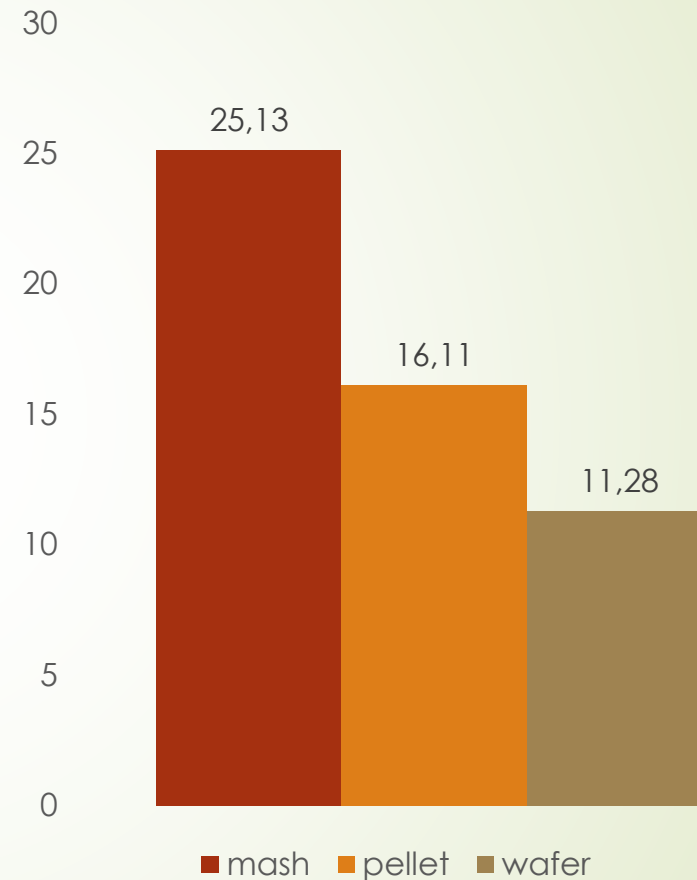
Based on the results of calculations assuming feed in the form of bulk and feed to saturate the entire storage space (hatch) it was found that the highest feed storage efficiency was found in pellet-shaped feeds of 70%. This is because pellets have a high density.

## ➤ Palatability of formulated feed

➤ Feed Consumption (gram/hour)



➤ Feed Adaptation (minute)



Wafers have the fastest time to adapt and the most consumption feed because it has a compact shape but is easily broken so that it is easily snatched by cows.



# RESEARCH 2





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*Study of Feeding Efficiency and Feeding Behavior Response  
of local Cattle Post-Transportation using  
KM Camara Nusantara*

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**Dr. Despal  
Prof. Luki Abdullah  
Nur'aini, SPt**





## Time and Location

### **HR Sapi Elite Farm (RPH Jatimulya, Tambun, Bekasi, West Java)**

- February-March 2019
- Rute :
  1. Kupang – Tanjung Priok (KM Camara Nusantara)
  2. Tanjung Priok – Cibitung (Truck)
  3. Cibitung – HR Sapi Elite Farm (Truck)

### **Andaka Cattle Farm (Kp. Cibodas, Conggeang, Sumedang, West Java)**

- May 2019
- Rute :
  1. Ciawi – Sumedang (Truck)

Table 1 Nutrient composition of feed in HR Sapi Elite (100% Dry Matter)

Nutrient (% Dry Matter) <sup>a</sup>	Type Of Feed				
	HR Sapi Elite			Andaka Cattle Farm	
	Field Grass	Concentrate	Soybean curd	Elephant Grass	Rice Straw
<b>Dry Matter</b>	52.22	78.73	11.70	12.55	85.23
<b>Ash</b>	9.32	10.53	7.22	15.10	12.67
<b>Crude Protein</b>	3.23	14.12	15.50	16.52	3.92
<b>Crude Fat</b>	0.35	6.78	8.59	4.47	3.43
<b>Crude Fiber</b>	40.39	12.50	16.50	33.08	25.74
<b>Nitrogen Free Extract</b>	46.71	57.07	52.18	30.83	42.17
<b>Total Digestible Nutrien</b>	49.57	64.38	71.86	53.92	47.51
<b>NDF</b>	78.51	-	-	65.27	-
<b>ADF</b>	49.57	-	-	41.36	-

Table 2 Feeding data on livestock body weight at each research location

Parameters	HR Sapi Elite	Andaka Cattle Farm
Average Body Weight (kg)	274	229,9
Feeding Data (kg DM)		
Grass	2,09	0,20
Rice Straw	-----	2,94
Soybean curd	0,59	-----
Concentrate	0,59	-----
Total	3,26	3,13
Persentase Pakan (% DM)		
Grass	39,42	5,25
Rice Straw	-----	94,75
Soybean curd	11,04	-----
Concentrate	49,53	-----
Total	100	100
Percentage of Feed / kg Body Weight (%)	1,93	1,36

Meat and Livestock Australia (2012) :  
 livestock access to **water and high-fiber** after the arrival of livestock is the most important priority during the recovery process from stress due to transportation.

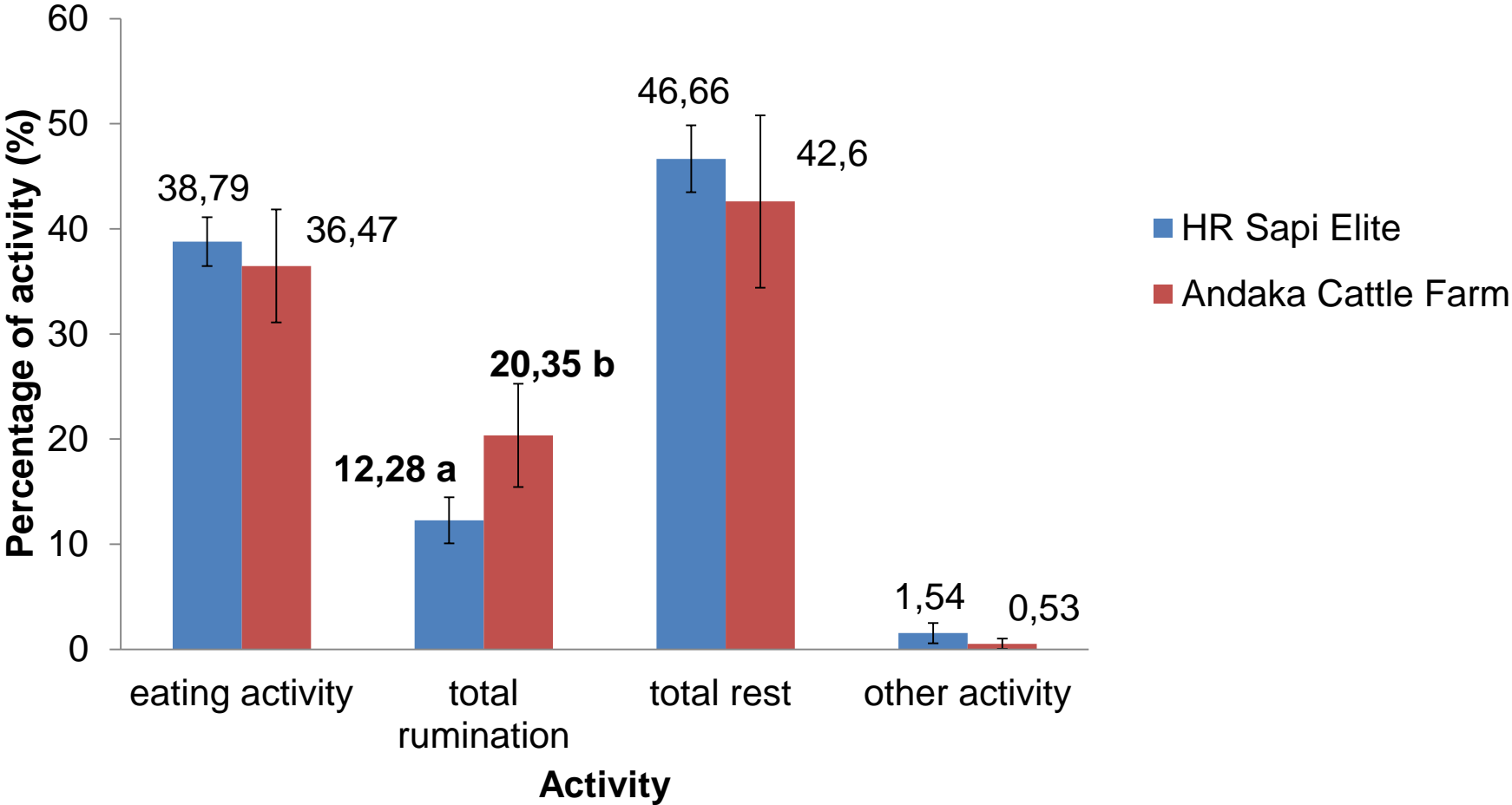
Tabel 3 Average of Intake and Feed Efficiency at each research location

Parameters	Location	
	HR Sapi Elite	Andaka
Total Observed Time (07.00-17.00) (hours)	10	10
Eating Time (hours)	3,24	3,53
Rumination Time (hours)	0,94	1,97
Intake		
Dry Matter Intake (g BK)	5298,12	3133,75
NDF Intake (g NDF)	4159,44	1602,43
Feed Efficiency		
Feeding Efficiency (g DM hours <sup>-1</sup> )	1691,79	895,84
NDF Efficiency (g NDF <sup>-1</sup> )	1328,18	458,85
Rumination Feeding Efficiency (g BK jam <sup>-1</sup> )	5686,84	1657,82
Rumination NDF efficiency (g NDF jam <sup>-1</sup> )	4464,61	852,57

Normal rumination time on Cattle is 6-7 hours/day (Fraser 1997;Beauchemin 1991)

Factors affecting rumination: Forage quality, feed digestibility and consumption of NDF (Beauchemin 1991)

**Graph 1 Comparison of Eating Behaviour  
at Research Sites**





# RESEARCH 3



# Feed Production Based on Local Resources



Hay straw



Elephant grass



Leucaena leaf  
(lamtoro)



Indigofera leaf



Cassava dregs  
(Onggok)



Molasses

Bahan Pakan	BK	Abu	PK	LK	SK	Pati	TDN	Ca	P
Rumput Gajah	22,2	12,0	8,69	2,71	32,3	43,7	52,4	0,475	0,347
Jerami Padi	40,0	16,9	4,15	1,47	32,5	45,0	43,2	0,413	0,292
Tetes	75,0	11,0	3,94	0,30	0,4	84,4	70,7	0,882	0,141
Indigofera	22,0	11,0	24,17	1,32	24,0	39,1	67,0	1,500	0,900
Lamtoro	24,8	7,5	24,20	3,72	21,5	43,1	74,4	1,680	0,210
Onggok	79,8	2,4	1,87	0,324	8,9	86,5	78,3	0,26	0,16

### Usage percentage of each formulations

	R1 (%)	R2 (%)	R3 (%)	R4 (%)	R5 (%)	R6 (%)
<b>Leucaena</b>	35	34	0	0	0	24
<b>Indigofera</b>	0	0	35	34	24	0
<b>Elephant Grass</b>	0	13	0	13	68	68
<b>Straw</b>	65	53	65	53	0	0
<b>Cassava Dregs</b>	0	0	0	0	8	8

R1&R2 without indigofera  
 R3&R4 without leucaena  
 R5&R6 without straw  
 + cassava dregs  
 All treatments were added  
 molasses as binder

### Nutrient content of each formulations

Formulation	Abu	PK	LK	SK	Pati	TDN	Ca	P
1	14,54	10,135	0,912	26,74	47,182	53,09	0,786	0,4593
2	14,05	10,589	1,036	26,72	47,052	54,01	0,7922	0,4648
3	13,49	10,144	2,028	25,99	48,37	55,31	0,84	0,2523
4	13	10,598	2,152	25,97	48,24	56,23	0,8462	0,2578
5	11,22	10,97	1,8077	26,28	48,998	58,445	0,70995	0,42765
6	10,52	10,976	2,5517	25,78	49,79	59,925	0,74595	0,28965

### Nutrient requirements for shipping cattle (MLA 2011)

Nutrient	TDN	Protein	Starch	Ca	p
<b>Requirements</b>	59,62	10,5-12	< 20%	> 0.55%	> 0.25%

# PRODUCTION

Cutting

Chopping

Drying

Grinding

Mixing



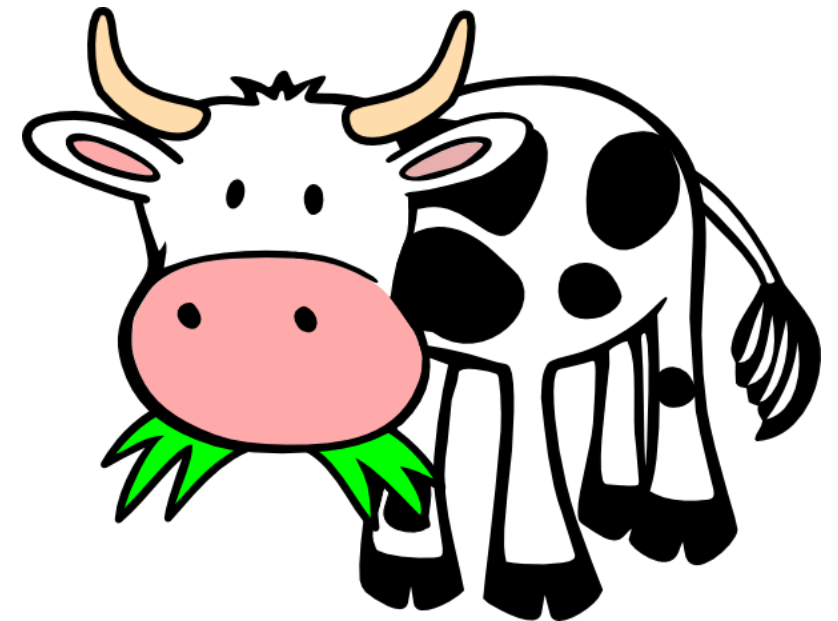
## Feed adaptability on cattle consumption

Formulation	Consumption (g/hour)	Duration (hour)	Duration (minutes)
1	387.0±63.8	2.64±0.45	158.58±27.04
2	372.6±106.3	2.90±0.99	174.17±59.17
3	323.0±83.3	3.30±1.03	198.27±61.68
4	326.8±78.9	3.20±0.71	191.82±42.55
5	419.4±58.1	2.42±0.33	145.22±19.60
6	394.8±60.9	2.58±0.41	154.99±24.65

- No significant difference
- Desired formulation (1,3,5)

Next step

- Forming to pellet, dried pellet, wafer, and cube



### Total consumption on feed treatments

Treatments	Total consumption (gram)
1	1533.33±755.35b
2	1583.33±1953.47b
3	1350.00±736.55b
4	3950.00±369.61c
5	4416.67±2577.35c
6	4633.33±498.88c
7	0±0a
8	0±0a
9	0±0a
10	2205.00±67.06bc
11	3168.00±864.29bc
12	2845.84±177.05bc

### Density of various feed types

Types	Density (kg/m <sup>3</sup> )
Mash	5.14±0.05
Pellet	10.15±0.13
Wafer	8.43±0.09
Dried pellet	8.29±0.12
Cube	7.27±0.09



- Higher consumption on wafer treatment (4,5,6)
- Best treatment 5 (high consumption, cheap, easy to provide)

# OUTPUT

- 4 papers presented at International Seminar on Animal Industry-4, 2018
- 1 paper presented at International Seminar in UMM, 2019

# CONCLUSION

- Current condition need to be improve by providing better feeds, form of feeds, better feeding practice, better feeding system
- Improvement can be based on local feed resources or applying logistic system more efficiently