



HỌC VIỆN NÔNG NGHIỆP VIỆT NAM
Vietnam National University of Agriculture

UTILIZATION OF AGRO BY-PRODUCTS AND SUPPLEMENTS FOR COMMERCIAL FEEDING AND FATTENING IN VIETNAM

Nguyen Thi Vinh and Nguyen Xuan Trach
Faculty of Animal Science, Vietnam National University of Agriculture

Hanoi, November 14, 2023

OUTLINES

1. AGRO-BY PRODUCTS IN VIETNAM
2. UTILIZATION OF AGRO-BYPRODUCTS AS FEED IN VIETNAM
3. SYSTEMATIC WAYS TO USE BY-PRODUCTS AS RAW MATERIALS FOR COMMERCIAL FEEDS
4. RECOMMENDATIONS FOR COOPERATION WITH AUSTRALIA



Why is it necessary to use Agro by-products?

- **70% of concentrates imported from foreign countries**
 - Feed cost is high in Vietnam
 - Need to explore economical feed resources
- **Crop and food processing byproducts (ABs) available in large quantities**
 - Considerable feed cost reduction by using cheap feeds
 - Value-added animal products
- **Prevention of environmental pollution**
 - If not properly utilized will become wastes and cause serious environmental pollution
- **Circular agriculture is now a driving force for sustainable development**



Why is it necessary to use Agro by-products?



Outside Buckingham Palace, Dr Orskov shows his OBE (Order of British Empire) medal awarded by the Queen

If crop residues are well utilised, Vietnam can double the number of ruminants without using the feed resources used for monogastrics.

Orskov (2001)

«Số lượng gia súc nhai lại ở Việt Nam còn rất ít so với nguồn thức ăn sẵn có này (phụ phẩm) và nếu được sử dụng tốt thì có thể tăng gấp đôi số lượng đầu con mà không phải sử dụng đến các nguồn thức ăn của các loài dạ dày đơn...» (Orskov, 2001).

1. AGRO BY-PRODUCTS IN VIETNAM

- Statistics on the number of Abs in Vietnam

Byproduct	Output (mil. tons/year)
Rice straw	42.8
Maize stover	10
Cassava foliage	3.1
Paddy husk	8.6
Fruit and vegetable processing residues	3.6
Sugarcane bagasse	3.5
Cashew apple fruit	3.1
Maize cobs	1.4
Cassava tube processing residues	1.3
Other byproducts	8.1
Total	85.5
Crop byproduct utilization rate (%)	52.25

DLP, MARD (2021)

- Statistic on the number of fruit and vegetable by-products of DOVECO company (tons/year)

No.	Products	Ninh Binh	Gia Lai	Son La
1	<i>Frozen product</i>	23.020	59.240	70.330
	Pineapple	5.120	10.240	7.680
	Sweet maize	7.800	15.600	29.250
	Passion fruit		27.000	27.000
	Vegetable soybean	3.900	3.900	3.900
	Spinach	2.500	2.500	2.500
	Banana	3.600	1.800	-
	Litchi fruit	100	-	-
	Mango			7.000
2	<i>Canned products</i>	5.175	5.175	
	Pineapple	1.600	1.600	
	Sweet maize	3.575	3.575	
3	<i>Concentrated product</i>	16.800	43.500	43.500
	Pineapple	16.800	10.500	10.500
	Passion fruit	-	33.000	33.000
	Total	44.995	107.915	113.830

(Doveco company, 2023)

2. STATUS OF UTILIZATION OF AGRO BY-PRODUCTS AS FEED IN VIETNAM

Common characteristics of ABs

- **Seasonality**
 - ✓ Depending on crop harvests
 - ✓ Can be utilized in part by livestock right after harvest
 - ✓ Need for preservation/storage
- **Imbalanced nutrients**
 - ✓ Rich in one nutrient but poor in others
 - ✓ Not good if used alone
 - ✓ Need for nutrient supplementation
- **Possible antinutritive/toxic compounds**
 - ✓ Different types of anti-nutritive compounds: lignin, HCN, tannin, gossypol, pesticide residues, aflatoxin, etc.
 - ✓ Reduced utilization of nutrients and/or poisoning
 - ✓ Need for possible treatment before feeding

2. STATUS OF UTILIZATION OF AGRO BY- PRODUCTS AS FEED IN VIETNAM

- **Fibrous crop byproducts**

By- product	Specific characteristics	Treatment	Main utilization
Rice straw	Rich in lignified fiber, bulky	Fresh feeding, drying, alkali treatment	Part of basal ration
Green maize stover	Rich in fiber, reasonable sugar	Fresh feeding, making silage	Basal ration
Sugar cane top	Rich in fiber, reasonable sugar	Fresh feeding, making silage	Part of basal ration
Pineapple residues	Rich in fiber, high in sugar	Fresh feeding, making silage, drying	Part of basal ration

2. STATUS OF UTILIZATION OF AGRO BY-PRODUCTS AS FEED IN VIETNAM

- **Protein-rich crop byproducts**

By- product	Specific characteristics	Treatment	Main utilization
Cassava foliage	Rich in protein and fiber	Fresh feeding, drying, making silage, boiling	Diet ingredient
Groundnut vines	Rich in protein and fiber	Fresh feeding, drying, making silage, boiling	Protein source ingredient
Cotton seeds	Rich in protein and fiber	Direct feeding, alkali treatment, grinding	Protein source ingredient
Sweet potato vines	Rich in protein, pectin, fiber	Direct feeding, drying, boiling	Diet ingredient

2. STATUS OF UTILIZATION OF AGRO BY-PRODUCTS AS FEED IN VIETNAM

- **Food processing byproducts**

By-product	Specific characteristics	Main utilization
Fish meal	Rich in protein, slowly fermented in rumen	Protein supplement
Brewer grains	Rich in fiber, protein and prebiotics	Catalistic supplement
Mollases	Rich in sugar	Easily fermentable energy suppl.
Oil cakes	Rich in protein & energy, easily fermented in rumen	Protein supplement, ingredient of compound feed, formaldehyde treated as bypass CP
Rice bran	Rich in protein and energy	Protein and energy suppl.
Cassava tube residues	Rich in starch	Energy suppl., ingredient of compound feed

3. SYSTEMATIC WAY TO USE BY-PRODUCT AS RAW MATERIALS FOR COMERCIAL FEED

Agro by-products and processed agro by-products can be use as materials for:

- Total Mixed Ration
- Fermented Total Mixed Ration



SYSTEMATIC WAY TO USE BY-PRODUCT AS T.M.R RAW MATERIAL

Agricultural byproducts



Evaluation of feed value

Evaluation of nutrient requirement

Feeding standard

Calculate feed formulation using program

Feed formulation program

Development of optimal processing condition

Composition	Composition (g/kg diet)			
	AIN-63M ^a	Feed P1	Feed P2	Feed P3
Corn starch	620.692	554.129	487.565	396.002
Casein	140	124.304	106.407	97.911
Soybean	100	100	100	100
Soybean oil	40	38.486	36.973	35.459
Fiber	50	25	0	0
Mineral mix	35	25.977	16.954	7.930
Vitamin mix	10	10	10	10
L-cystine	1.8	1.8	1.8	1.8
Choline Bitartrate	2.5	2.5	2.5	2.5
THIQ	0.008	0.008	0.008	0.008
TTU	-	117.797	235.593	353.390
Total(g)	1000	1000	1000	1000

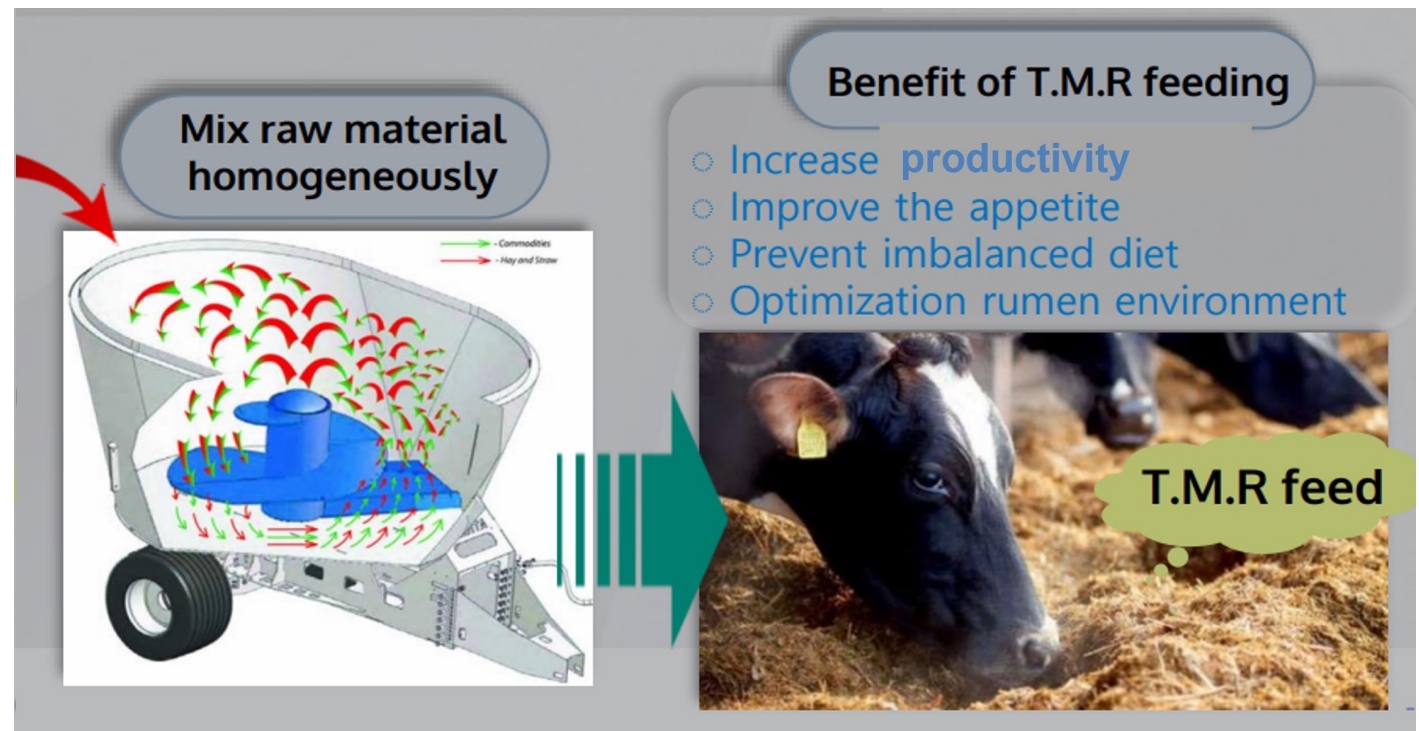


Total Mixed Ration

SYSTEMATIC WAY TO USE BY-PRODUCT AS T.M.R RAW MATERIAL

TMR: Complete mix of all ingredients

- Forage
- Grain
- **By-products/processed by products**
- Protein feeds
- Minerals and Vitamins
- Feed additives

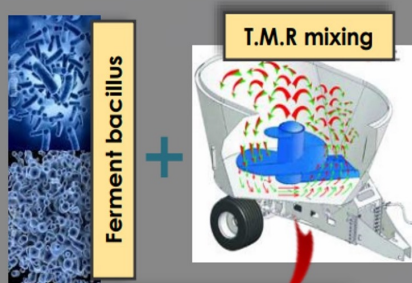


SYSTEMATIC WAY TO USE BY-PRODUCT AS F.T.M.R RAW MATERIAL

TMR: Complete mix of all ingredients

- Forage
- Grain
- **By-products/processed by products**
- Protein feeds
- Minerals and Vitamins
- Feed additives

F.T.M.R (Fermented T.M.R)



T.M.F is a feed obtained form fermenting T.M.R added bio-technology.

Digestibility

Increase F.I (feed intake)



Absorption

Rumen optimization effect

Feed efficiency

Preservation

Keep succulent feed quality in tropical regions



Appetite

Stimulation with refreshing flavor

- EXPERIMENTAL RESULTS**
(rice straw treatment) IN VNUA, VIETNAM

- Effect of urea treatment of rice straw on growth performance of cattle*

	Untreated dry straw	Urea treated dry straw	Urea treated fresh straw
No of cattle (heads)	6	6	6
Initial weight (kg/head)	139.1	137.4	138.5
Final weight (kg/weight)	154.8 ^a	162.8 ^b	165.3 ^b
Total weight gain (kg/head)	15.7 ^a	25.3 ^b	26.8 ^b
ADG (g/head/day)	209.3^a	337.7^b	357.3^b

Source: Trach et al. (2014)

APPLICATION OF OF RICE STRAW TREATMENT IN VIETNAM

- In households



APPLICATION OF OF RICE STRAW TREATMENT IN VIETNAM

- On large farm: TH True Milk, Nghe An province



APPLICATION OF OF RICE STRAW TREATMENT IN VIETNAM



TH MILK FOOD
JOINT STOCK COMPANY
Nghĩa Sơn, Nghĩa Đàn District
Nghệ An Province
Tel: 038. 3963 090
Website: www.thmilk.vn

CÔNG TY CỔ PHẦN
THỰC PHẨM SỮA TH
Xã Nghĩa Sơn, Huyện Nghĩa Đàn
Tỉnh Nghệ An
Fax: 038. 3963 091



ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincerest and deepest thanks to Assoc. Prof. Dr Nguyen Xuan Trach for his valuable support as well as his technical advice to TH Food Joint Stock Company during the past two years. The Company's Feed Center has made a very good number of achievements in terms of feed manufacture from local agricultural by-products thanks to the effective application of the valuable technologies introduced by Assoc. Prof. Dr. Nguyen Xuan Trach .

Especially, the technology of preserving fresh straw with urea as suggested by Assoc. Prof. Dr. Trach has helped us make use of thousands of tons of rice straw with the content of protein increased more than twice in comparison with the normal rice straw. This has helped us to reduce the cost of feeding dairy cows, thus saving millions of dollars for the company every year. In addition to the economic benefits to our Company, the use of rice straw collected from the different districts of Nghệ An and Thanh Hoa provinces has limited the burning of rice straw that adversely affects the environment, public health, and field ecosystems. Moreover, the purchase of rice straw as cattle feed has created a considerable additional income for the local farmers, that would thus also make our company's business more sustainable in the long run in the local context where most of the population rely their livelihood on agriculture in which rice is the main crop with huge amounts of rice straw leftover after each harvest. It is for the above

mentioned benefits that we have had a plan to double the amount of rice straw collected next year for use as dairy cattle feed through treatment with urea .

With this letter, I would also like to express my immense thanks to all of the lecturers of Hanoi University of Agriculture for all the supports and technical advice they have made since our dairy cow project started.

Once more, with all mentioned, and to many more, I would like to extend the warmest thanks from the bottom of my heart and hope that we will have further good cooperation and receive a lot of recommendations from all of you in the near future.

With best regards.



Feeding & Nutrient General Manager

HANAN SAGGI



* EXPERIMENTAL RESULTS (Maize cobs, sugarcane bagasse, passion fruit peel) in VNUA, VIETNAM

- *Using maize cobs, sugarcane bagasse, passion fruit peel as raw materials to making FTMR*

- Meets nutritional needs

- Reduce feed cost by 6,600 VND/head/day



Recommendations for cooperation with Australia

- Develop a joint collaboration project addressing the following steps:
 - Survey agricultural by-products with potential as raw materials for T.M.R or F.T.M.R feed in Vietnam;
 - Evaluate and select substitute feed ingredients from agricultural by-products with Australian experts;
 - Develop methods to locally process final by-product ingredients;
 - Commercialise and produce TMR feed products for national and international markets;
 - Investment in construction of TMR raw materials plant.



Many thanks!