Major forage cultivars and utilization in Taiwan

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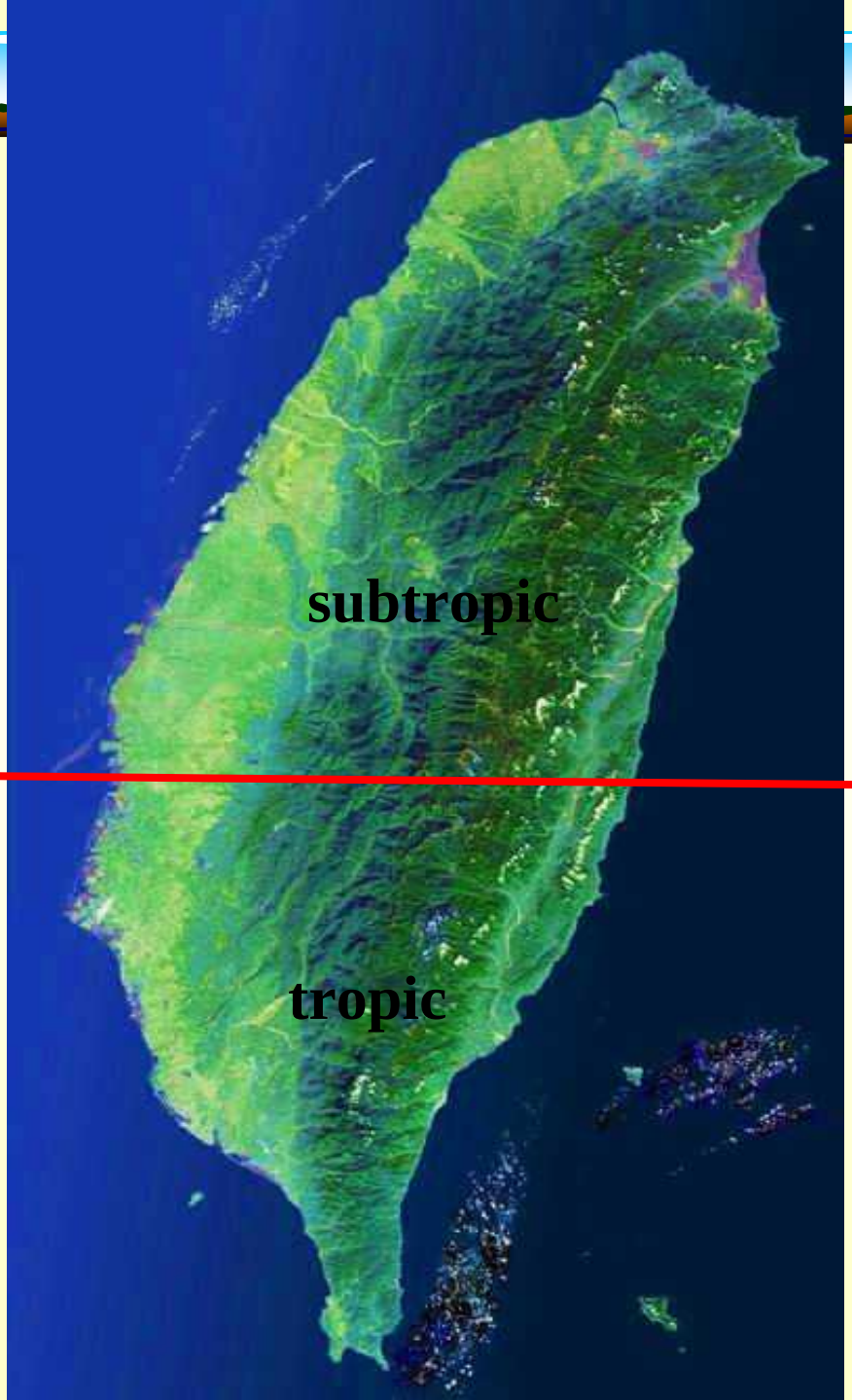
Taiwan



Introduction

Taiwan is located in subtropical and tropical areas. The climatic condition is suitable for growing tropic forage grasses.

Buffaloes, Hybrid cattle, Dairy cattle

Meat goat, Milk goat, Deer

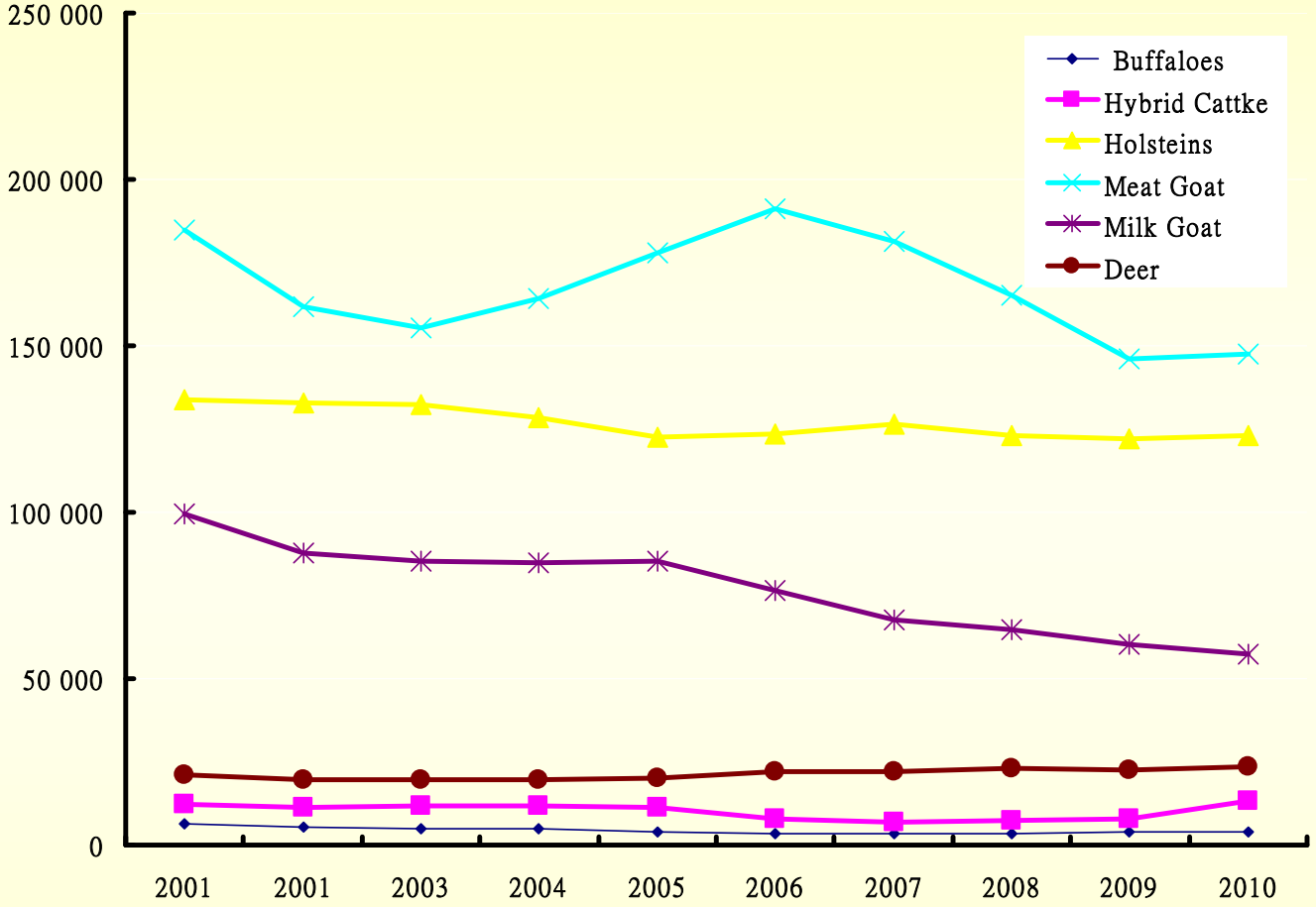


Fig. 1. The head numbers of ruminants in Taiwan.

The amount of dry forages to meet the requirement for feeding animals are about 638,925 mt yearly .

Domestic forage production can supply only about 52.8% of the total forages required. The shortage of the forages is provided by the imported hays or the agricultural by-products.

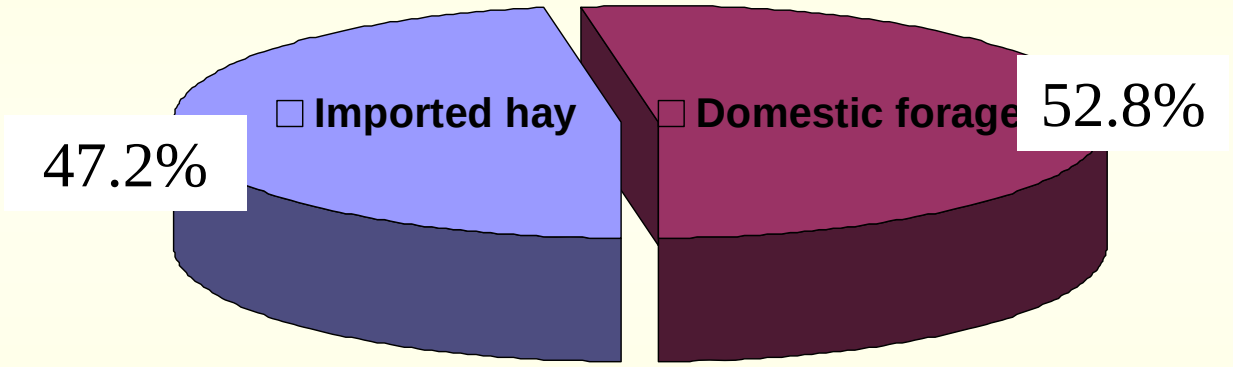


Fig. 2. Percentages of domestic and imported hays.

The averaged amounts of imported hays with both forage legume and grass are 249,853.1 mt yearly. It costs about US $ 29.698 million.

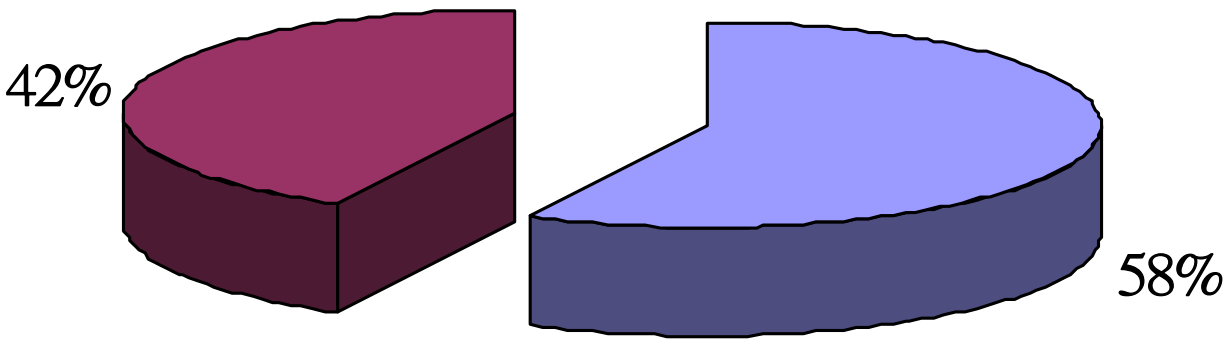


Fig. 3. Averaged percentages of imported forage legume and grass.

To select the forage species with high forage yield and quality for feeding animals in Taiwan.

(1) Pangolagrass (*Digitaria decumbens*) (1974)

(2) Napiergrass Taishu No. 1 (*Pennisetum purpureum*) (1991)

(3) Sudangrass Taishu No. 1 (*Sorghum sudanense*) (1995)

(4) Napiergrass Taishu No. 2 (1996)

(5) Nilegrass Taishu No. 1 *(Acroceras macrum*) (1997)

(6) Silage corn (*Zea mays*) (1992~1999)

(7) Forage sorghum Taishu No. 1 (*Sorghum bicolor*) (2009)

(8) Napiergrass Taishu No. 3 (2009)

(9) Napiergrass Taishu No. 4 (2010)

(10) Napiergrass Taishu No. 5 (2011)

(11) Alfalfa (*Medicago sativa*)

The planted areas and production of domestic forage crops for recent 10 years are shown in Fig. 2 and Table 1, respectively.

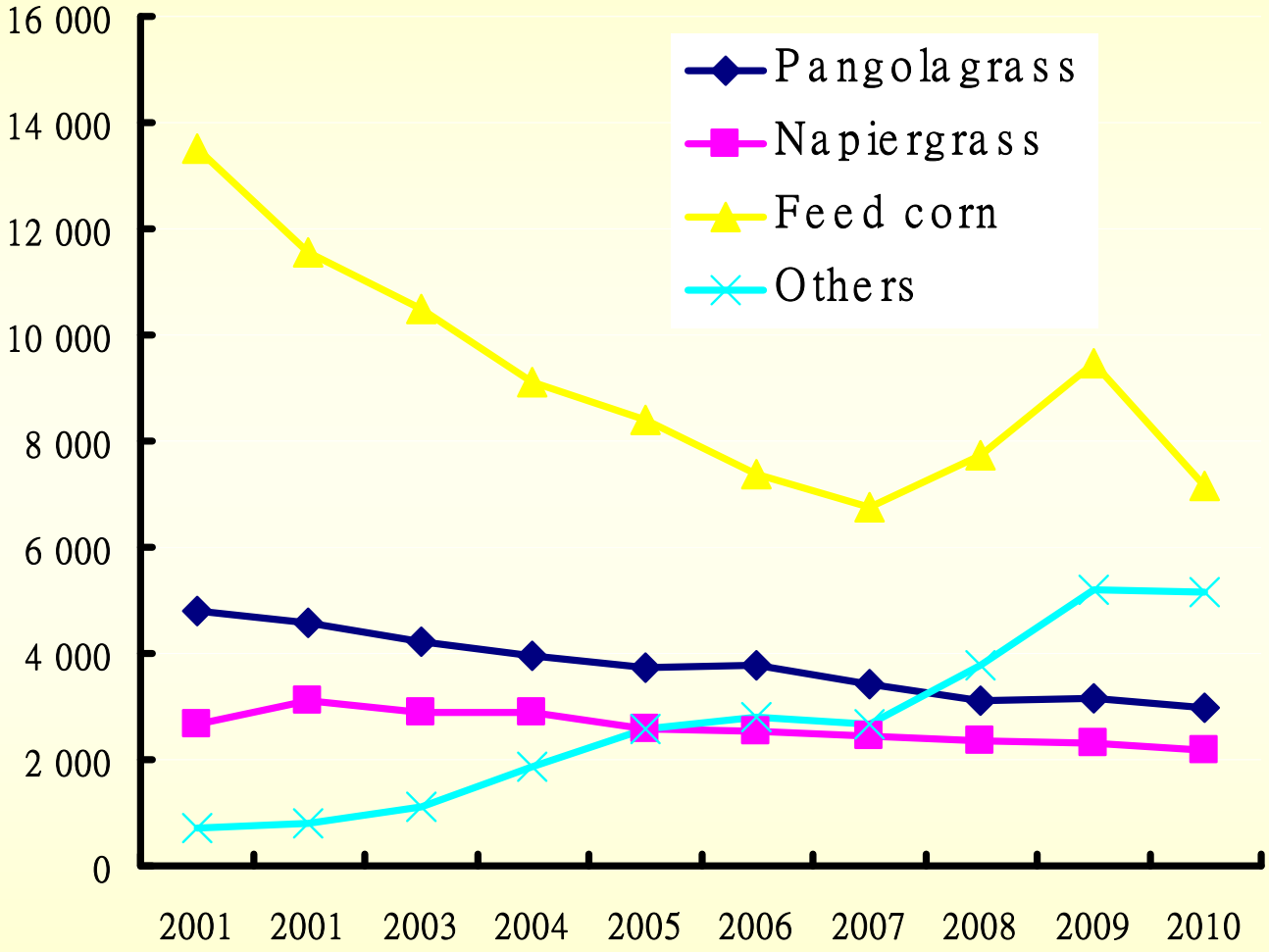


Fig. 2. The planted areas of the forage crops grown in Taiwan.

Table. 1. The forage crops produced in Taiwan.

	Pangolagrass	Napiergrass	Feed corn	Others
year	----------m.t.----------			
2001	386 370	486 715	59 223	73 316
2001	369 674	519 949	60 230	74 394
2003	321 198	507 157	53 134	82 586
2004	319 245	514 637	45 631	101 039
2005	283 427	399 496	41 820	160 240
2006	299 134	425 012	37 358	189 783
2007	237 603	362 570	33 885	168 978
2008	212 529	332 116	37 290	213 796
2009	222 763	328 234	45 981	283 044
2010	203 975	321 302	34 551	267 043

Major Forage Crops

A. Forage grass

Pangolagrass (*Digitaria decumbens*)

Hay production

Cutting

Drying

Roll

Trooped

Rolling

Hay

Pangolagrass haylage

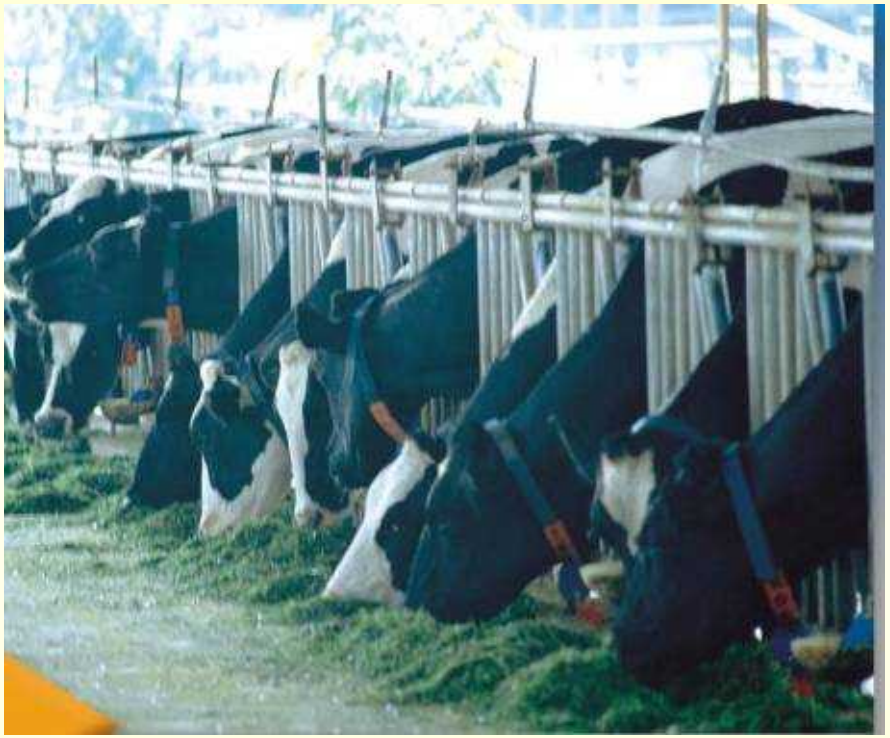
Pangolagrass haylage

Napiergrass (*Pennisetum purpureum*)

Napiergrass Taishu No. 1 (1991)

Napiergrass (*Pennisetum purpureum*)

Napiergrass Taishu No. 2 (1996)



Green chop

Silage

Table 2. Comparison of milk yield and composition of Holstein dairy cows fed on napiergrass silages

Diet	Dairy cow	Milk yield	Milk fat	Specific gravity
	head	kg/head/day	%	
A[@]	69±3.0	19.6±0.8	3.79±0.12	1.0310±0.002
B	95±4.0	20.0±2.1	3.61±0.12	1.0306±0.002
C	36±4.0	21.3±2.3	3.83±0.12	1.0311±0.002

@A: Napiergrass silage, B: Napiergrass silage + bermudagrass hay,

C: Napiergrass silage + alfalfa hay.

Napiergrass (*Pennisetum purpureum*)

Napiergrass Taishu No. 3 (2009)

Table 3. Comparison of milk production and composition between TLG2 and TLG3#

Test	cv. TLG 2	cv. TLG 3	SEM	*P*-Value
DMI, kg/d	1.84	2.20	0.13	*
Body weight change, g/d	15	37	19	NS
Milk production, kg/d	1.96	2.22	0.07	*
3.5% FCM, kg/d	1.87	2.12	0.12	< 0.10
Milk efficiency, milk/DMI	1.04	1.00	0.12	NS
Milk fat, %	3.28	3.16	0.15	NS
Milk protein, %	2.92	2.88	0.02	*
Milk lactose, %	4.14	4.11	0.05	NS
Milk total solid, %	10.99	10.91	0.20	NS
Milk urea nitrogen, mg/dL	31.5	28.5	0.92	< 0.10

#TLG2:Napiergrass Taishu No.2, TLG3:Napiergrass Taishu No.3

Napiergrass (*Pennisetum purpureum*)

TLG4

TLG2

Napiergrass Taishu No. 4 (2010)

Napiergrass Taishu No. 5 (2011)

Food

Gelatin

Tea

Drink

Sudangrass (*Sorghum sudanense*)

Nilegrass (*Acroceras macrum*)

Nilegrass Taishu No. 1

Nilegrass silage

Silage corn (*Zea mays*)

Silage

Forage sorghum（*Sorghum bicolor*)

Forage sorghum（*Sorghum bicolor*) Production

Pangolagrass and nilegrass are used as green chop or haylage and hay.

Napiergrass, sudangrass, forage sorghum and silage corn are used as green chop or silage.

B. Forage legume

Some forage legumes are also grown, i.e., alfalfa (*Medicago sativa*), berseem clover (*Trifolium alexandrinum*) and soybean (*Glycine max*).

Alfalfa (*Medicago sativa*)

Berseem clover (*Trifolium alexandrinum*)

Soybean (*Glycine max*).

Alfalfa and berseem clover can be used for green chop and making haylage.

C. Agricultural By-products

The agricultural by-products, i.e., rice straw, soybean stem and peanut vine, can be used to make hay to feed beef cattle or goat in Taiwan. Soybean pods and sweet potato vine can be made silage.

Rice straw

Peanut vine

Soybean stem

Brewer’s grains

Brewer’s tea

Conclusion

1. Tropic forage species can adapt to grow in Taiwan. Forage can be produced through the year.
2. Tall types of forage, i.e., napiergrass, sudangrass and silage corn, can be made silage.

Conclusion

3. Creeping types of forage, i.e., pangolagrass and nilegrass can be made hay and haylage.
4. Both silage and hay can be made when the forage crops are very productive in the growth seasons.
5. Both silage and hay can be stored to feed animals in winter when the forage crops stop to grow.

Thank You for Your Attention