Water hyacinth (*Eichhornia crassipes*): an invasive weed or a potential feed for goats?

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Introduction

- Aquatic plants are abundant during the course of flooding in the Mekong delta
- Locally available feed resources are very important in smallholder production systems

Introduction

Water hyacinth (*Eichhornia crassipes*)

- A perennial aquatic plant species
- Extremely high growth rate → traffic jam on marine transportation
- Som researchers claim nutritive value of WH is similar to high quality forage

Water hyacinth (*Eichhornia crassipes*)

- **Used for water purification, and as green fertilizers for the land**

- **Making handicraft products**

However, leaves of WH are mainly wasted
→ environmental pollution

Harvest of water hyacinth stems

(Source: Mai Xuan Thao, 2008)

Drying water hyacinth stems

(Source: Mai Xuan Thao, 2008)

Sun dry and transportation water hyacinth stems

Source: Mai Xuan Thao, 2008

Making handicraft products

Source: Mai Xuan Thao, 2008

Objective

- To evaluate leaves or leaves + stems of water hyacinth as basal diet for growing goats

- Will supplementation with other foliages improve the utilization of water hyacinth by growing goats

Materials & Methods

Location

Animal Research Station,

An Giang University

Water hyacinth in field

Water hyacinth leaves

***Sesbania sesban* in field**

Sesbania sesban foliages

1. Digestibility experimental diets

- **WH leaves *ad lib* +**
  - **1% (of LW as DM) *Sesbania sesban* foliage (WLS1)**
  - **2% *Sesbania sesban* foliage (WLS2)**
- **WH foliage (leaves + stem) *ad lib* +**
  - **1% *Sesbania sesban* foliage (WHS1)**
  - **2% *Sesbania sesban* foliage (WHS2)**

2. Growth diets

- **Water hyacinth leaves *ad lib with***
  - ***Sesbania sesban***
  - **Water spinach**
  - **Natural grass**
  - **Sweet potato vine**

***Sesbania sesban*, water spinach, natural grass and sweet potato vine at 1% of LW DM basis**

Experimental animals

- **Growth experiment**
  - 16 weaned crossbred goats, LW 10 kg
  - Housed in individual pens
- **Digestibility study**
  - 4 weaned crossbred male goats, LW 11kg
  - Housed in individual metabolism cages

- De-wormed with Ivermectin, vaccinated against Foot-and-Mouth disease

Experimental design

- **Digestibility study: Latin-square design (4*4) with 4 animals, 4 diets and 4 periods, lasted for 93 days**

- **Growth experiment: CRD with 4 treatments (diets), 4 replicates and 1 goat per unit, lasted for 90 days**

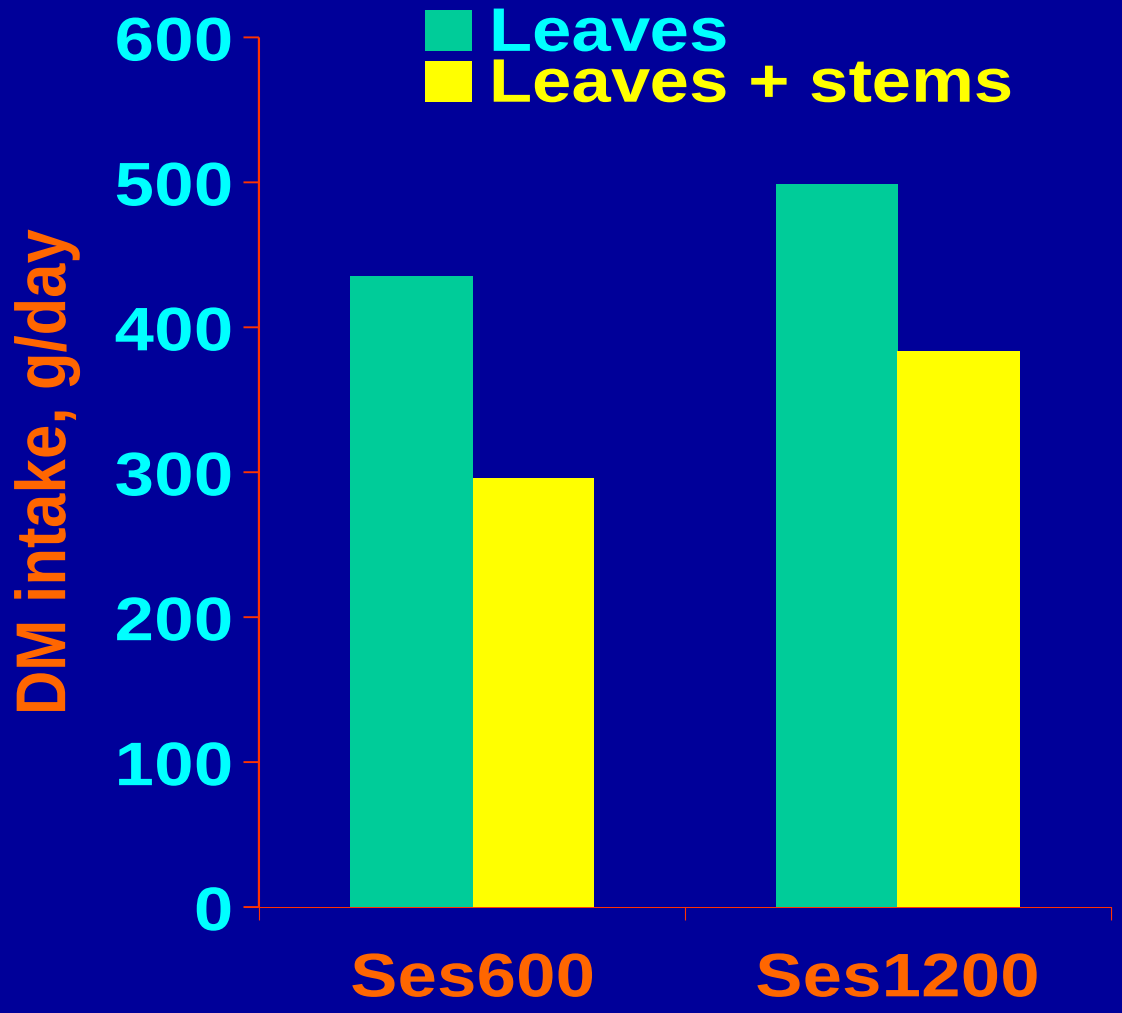
Experimental design (cont.)

- **Analysed statistically by an analysis of variance using the General Linear Model (GLM) procedure of Minitab Software Release version 13.1**
- **Tukey's pairwise test (P<0.05 or P<0.01)**

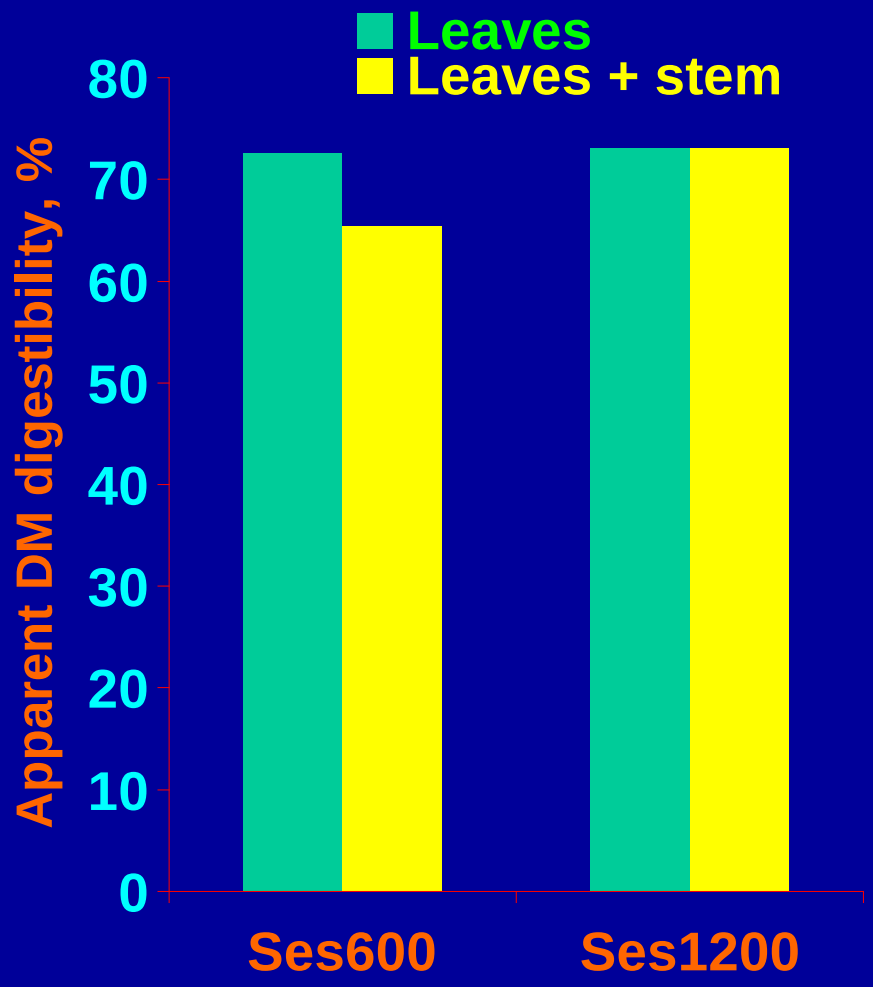
Table 1. Chemical composition of the digestibility experimental feeds

Item	Water hyacinth leaves	Water hyacinth leaves+stem	*Sesbania sesban*
DM, g/kg	123	81	202
g/kg DM			
CP	218	184	249
OM	861	841	907
NDF	556	618	554
ADF	254	279	259

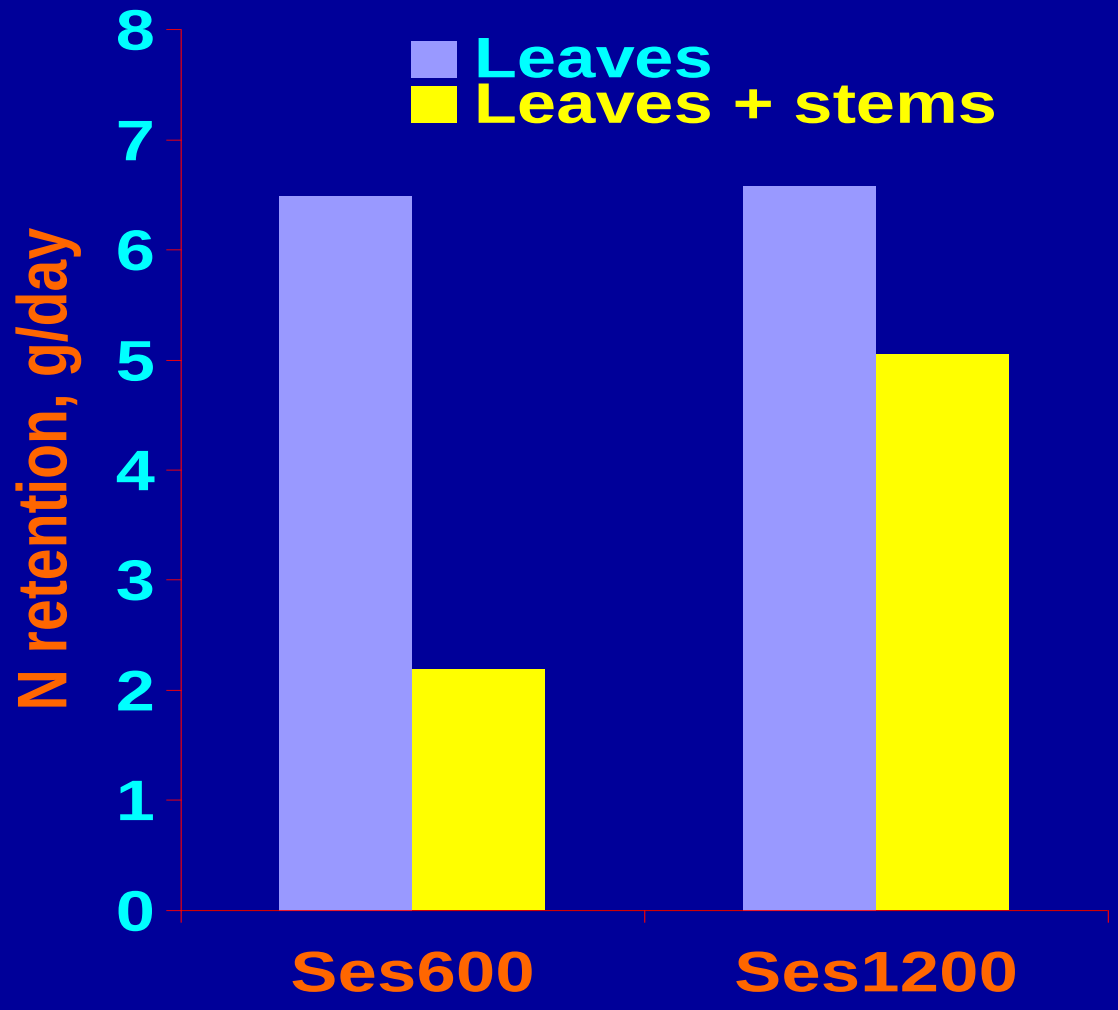
Dry matter intake during study



Apparent DM digestibility



Nitrogen retention during study



Chemical composition of the growth experimental feeds

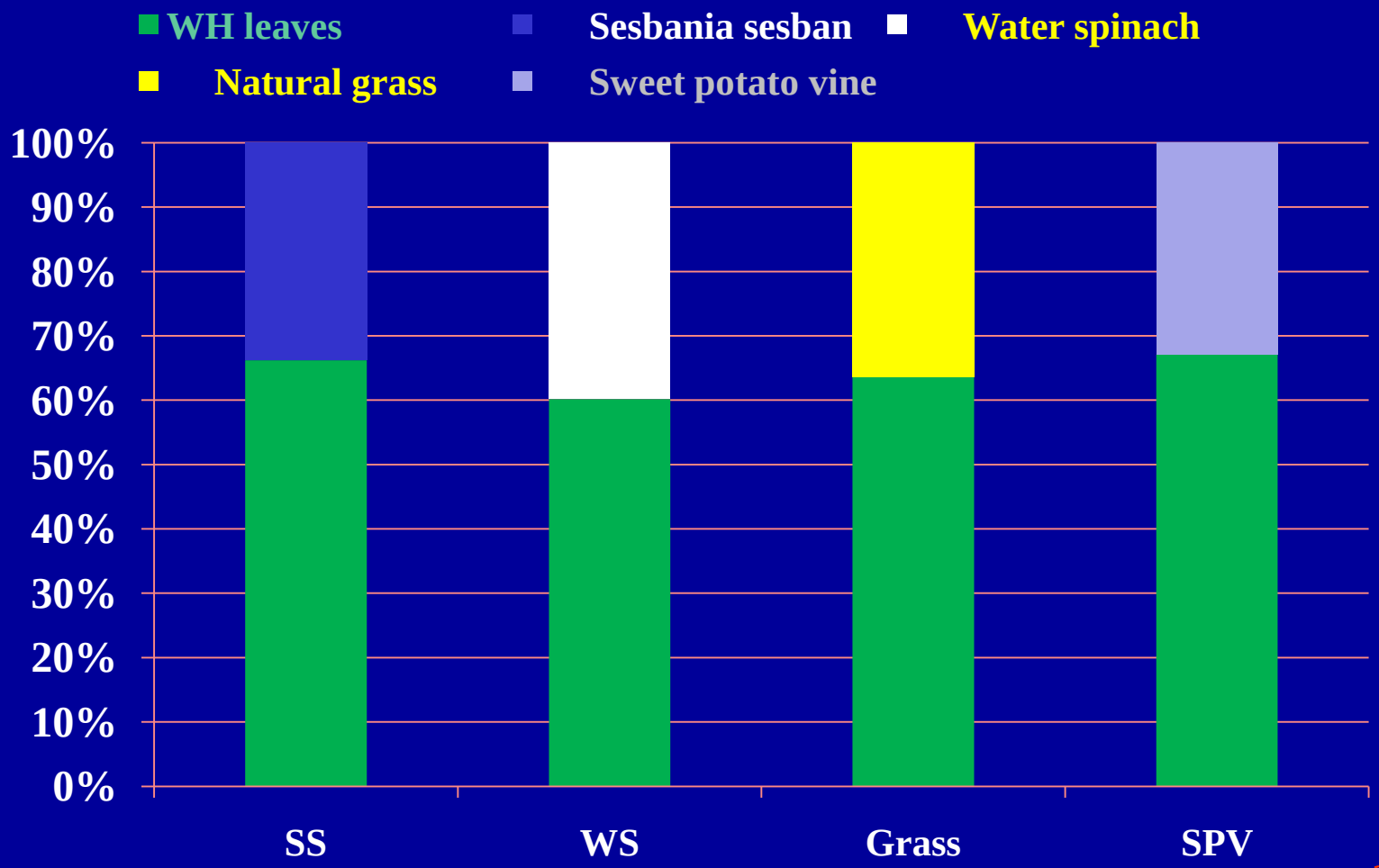
Item	DM (g/kg)	CP (g/kg DM)	OM (g/kg DM)
Water hyacinth leaves	118	237	871
Sesbania sesban	154	369	881
Water spinach	108	348	869
Natural grass	175	170	875
Sweet potato vine	109	308	841

Feed intake during the growth experiment

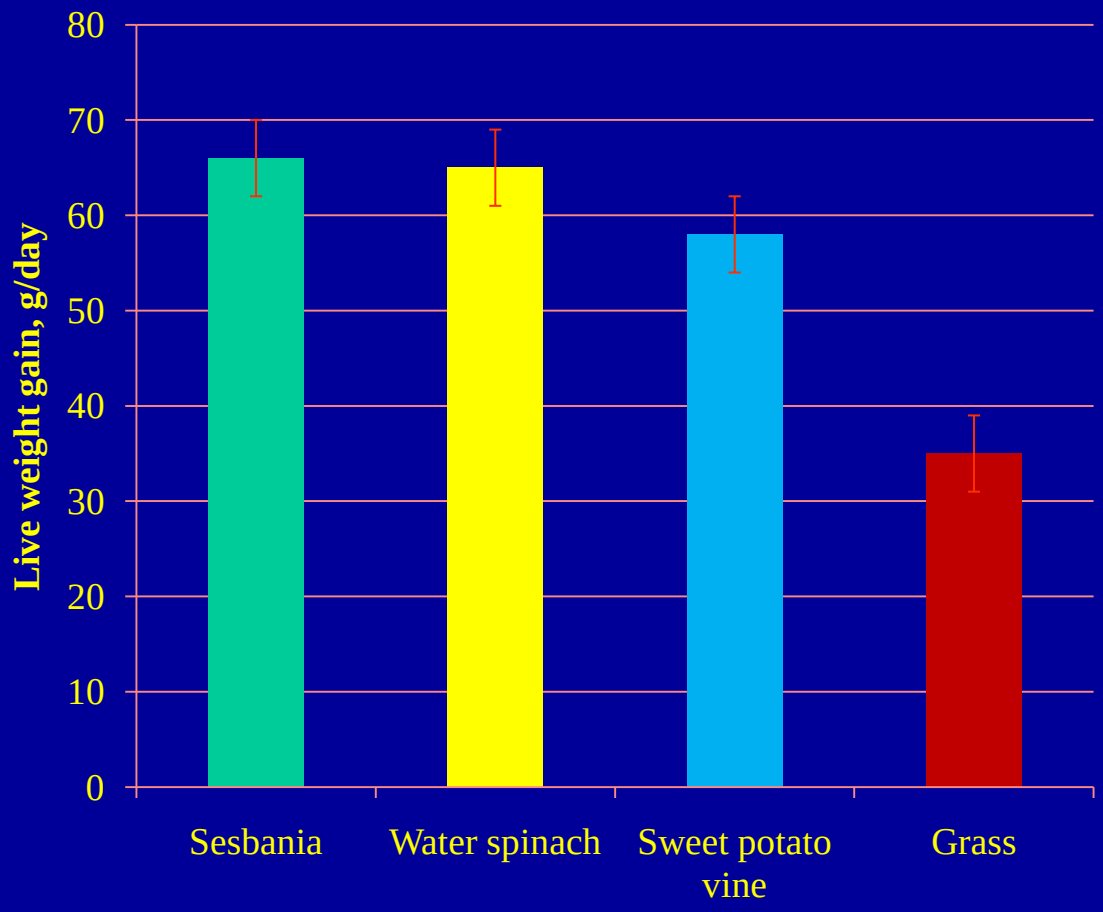
Item	Experimental diets			
	SS	WS	Grass	SPV
Feed offered, g DM/day	405	432	444	452
Feed intake, g DM/day				
Water hyacinth leaves	237^{b}	231^{b}	243^{b}	273^{a}
Sesbania sesban	121	-	-	-
Water spinach	-	153	-	-
Natural grass	-	-	139	-
Sweet potato vine	-	-	-	134
Total	358^{c}	383^{b}	382^{b}	407^{a}
Nutrient intake, g/day				
CP	103^{b}	109^{a}	83^{c}	108^{a}
OM	315^{c}	336^{b}	335^{b}	352^{a}

^{a,b,c}Means within rows with different superscripts are significantly different (P<0.05)

Proportion of diet components (DM basis)



Live weight gain of goats fed WH with different supplements



Conclusions

- **Feed intake and N retention were higher when water hyacinth leaves were the basal diet rather than leaves + stems**

- **Growth rates were higher when *Sesbania sesban*, water spinach or sweet potato vines were used to supplement the water hyacinth leaves, compared with grass**

In overall

- WH leaves can be used as green forage for growing goats at small holder farms
- The high proportion of leaves from handicraft can be available all year round for goats

We do not treat WH like weed!!

THANKS FOR YOUR ATTENTION!