Beef production and silvopastoral systems

Opportunities for Colombia

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Agri benchmark Beef and Sheep Conference

2015

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Beef market has a great potential

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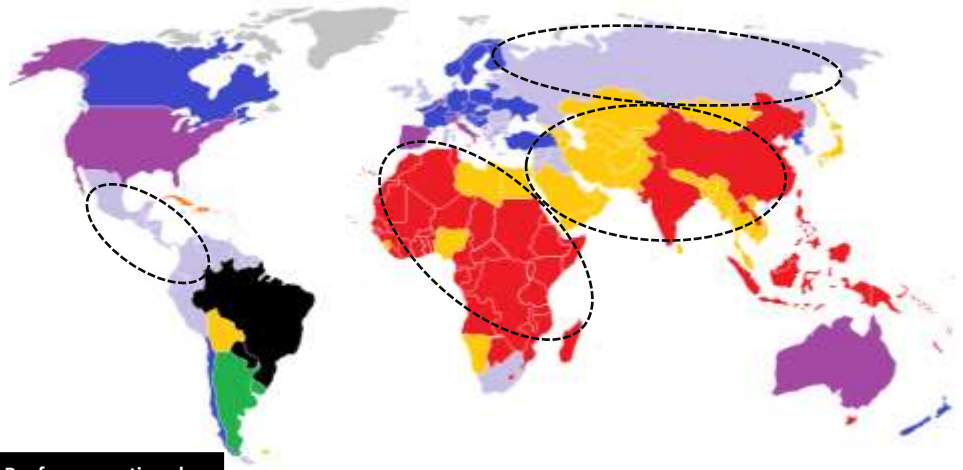
Great potential arround the world to increase meat consumption

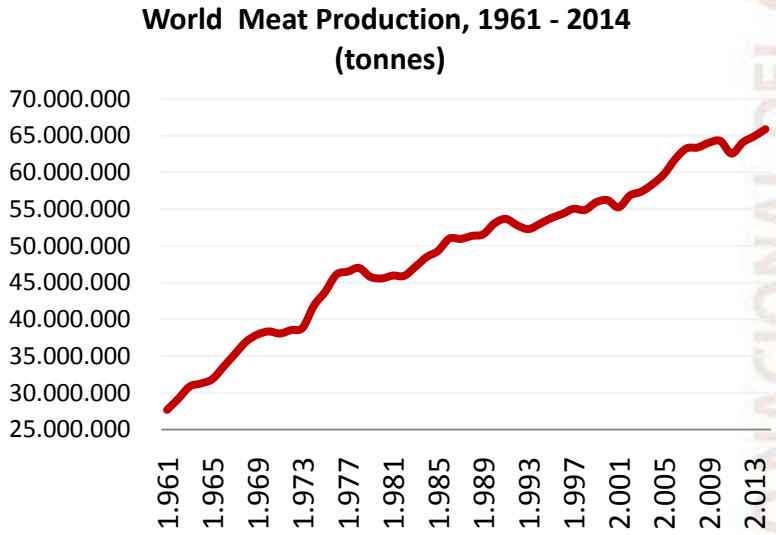
Meat growing demand



Beef consumption by country (kilos / year / inhabitant)
Less than 5
between 6 - 10
between 11 - 20
between 21 - 30
between 31 - 40
between 41 - 50
More than 50

- FAO recommends annual per capita lean meat consumption to be 33 kg. Currently, world average meat consumption is 10 kg/person/year.
- 62% of world´s population still has potential to increase meat consumption.
- Asia and Latin America are the regions with the greatest consumption potential, considering their income growth rates.
- Africa requires global assistance to increase its consumption levels.
- Despite China´s protein intake is based on pig meat, bovine meat consumption is expected to growth as influence from western economies become more relevant.

Growing but insufficient production



- World bovine meat production was over 65 million tonnes in 2014.
- Between 1961 and 2014 meat production grew 136%.
- Global bovine meat production is projected to be over 84 million tonnes by 2030.

Source: FAPRI - FAO

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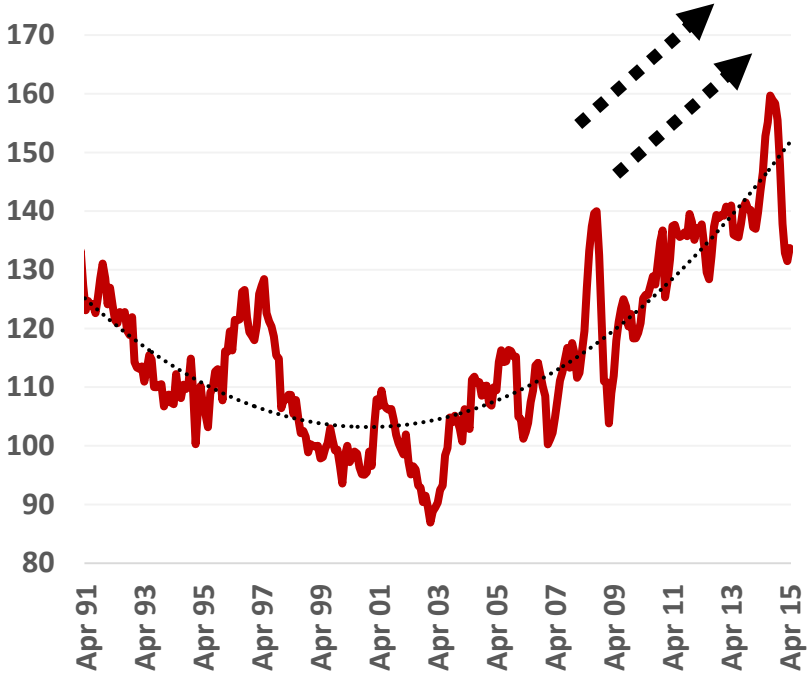
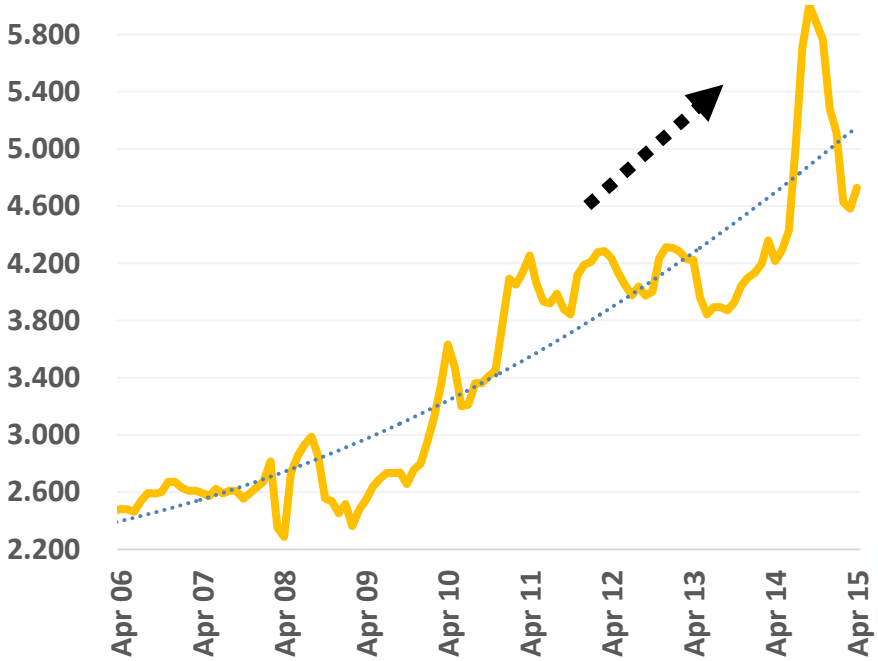
International meat prices have moved upwards, as a result of growing demand and unajusted supply in global commerce.

Meat Price Index - FAO (real terms)



Beef Import Price - Australian lean exports to USA (US$ CIF/tonne)



Prices are expected to keep growing along with a unbalanced supply. Potential benefits for those who get to produce meat.

Source: International Monetary Fund IMF – Food and Agriculture Organization of the United Nations FAO

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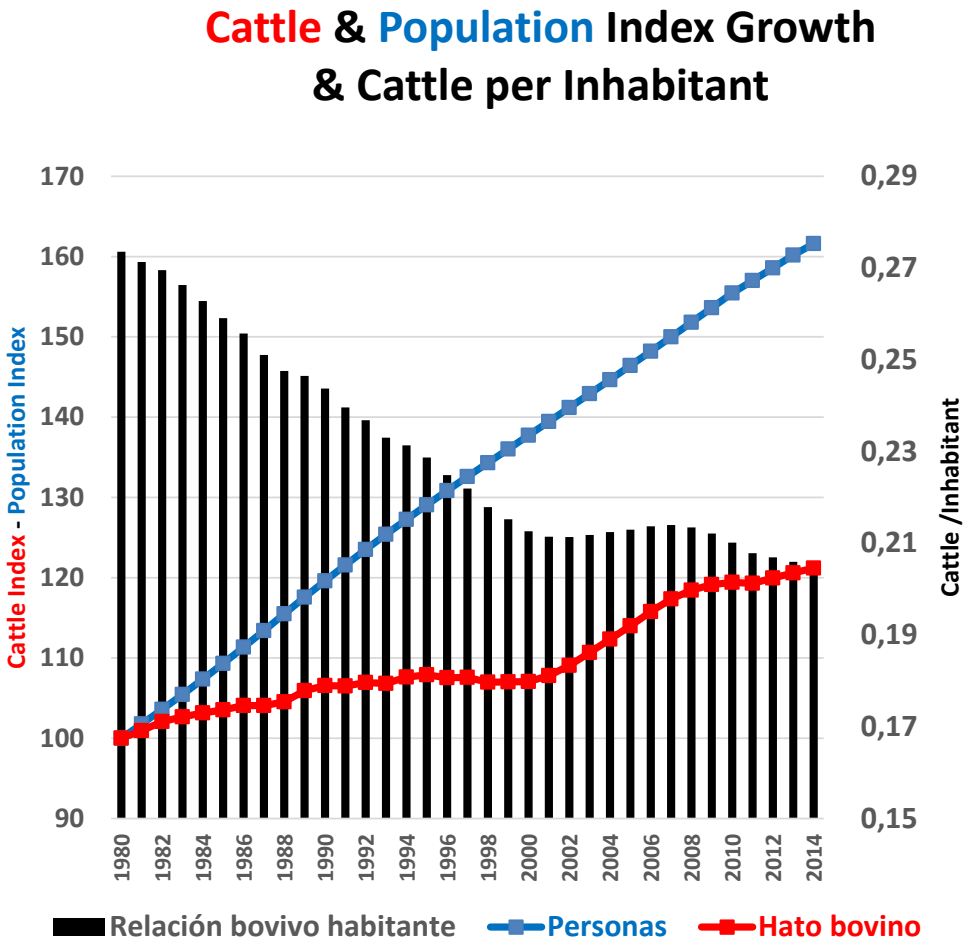
World population growth and cattle herd size represent a major opportunity for countries with large cattle inventories

- Global population growth rate has moved faster than cattle inventories.
- Successful countries in producing and trading meat will be those that reach high productivity levels and keep appropiate cattle inventory size.



Source: Food and Agriculture Organization of the United Nations FAO

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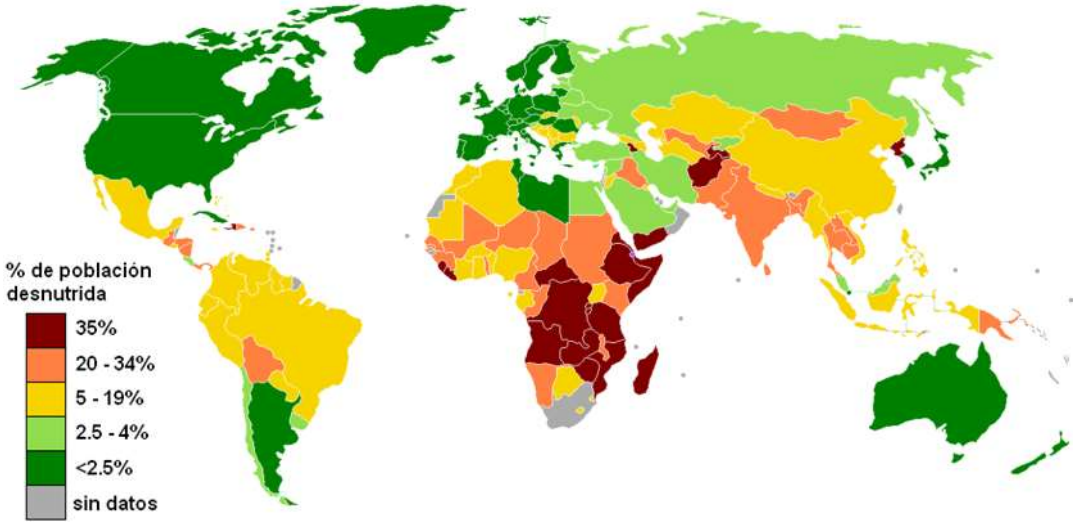
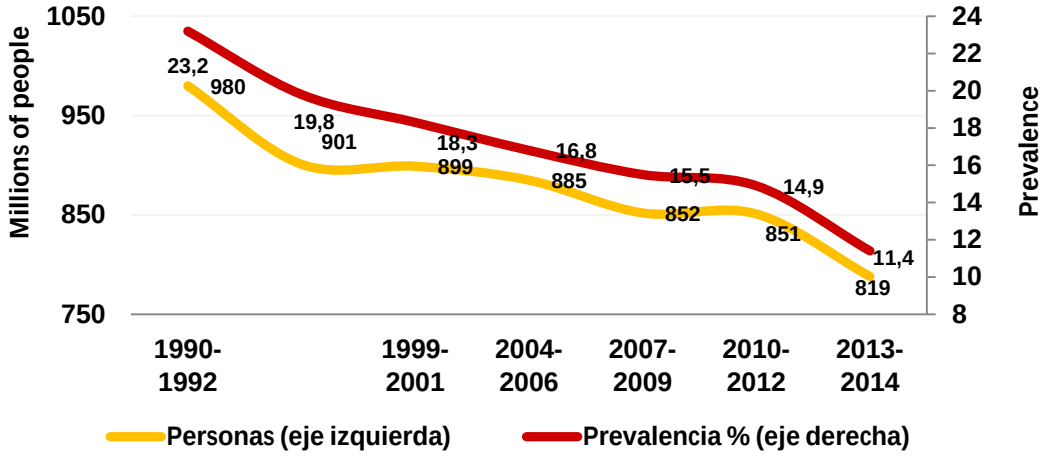
World trend shows a substantial increase in animal protein demand

Prevalence of Undernourishment (% of World Population)



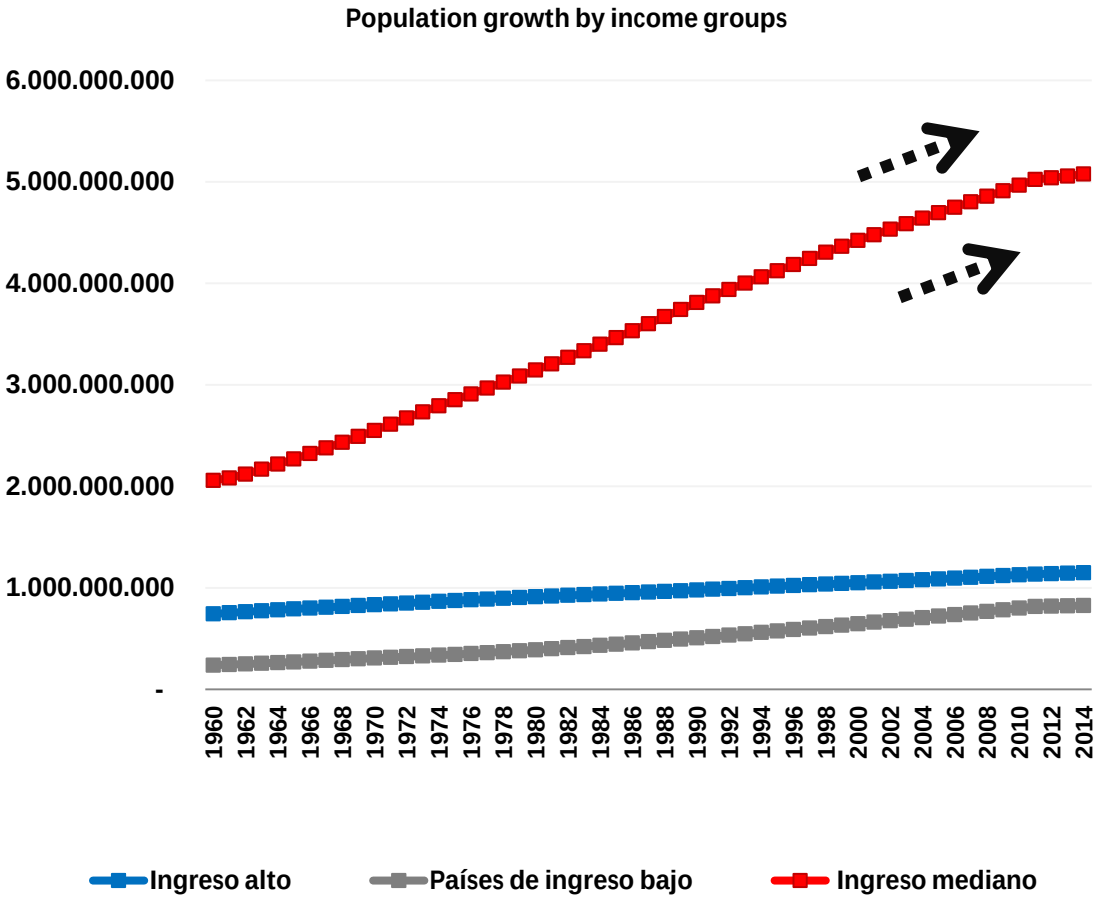
Undernourishment in developing countries



Source: Food and Agriculture Organization of the United Nations FAO

- Even though the number of undernourished people in the world exceeds 800 million, there has been some progress in reducing hunger during the last decades.
- More animal protein consumption has been determinant to hunger decline arround the world. Increased bovine meat demand has contributed as well.
- As long as disposable income would grow in developing countries, the marginal propensity to eat meat will rise.

Economic development and population growth improve meat demand



- **Middle income countries have the largest population growth rates. That suggests a possibility to get access to higher quality goods.**
- **The rapid growth reached during the last two decades by economies like China and India -which represent both 37% of global population- has contributed to rising meat demand.**

Source: World Bank

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Colombia has major opportunities to compete in bovine meat markets

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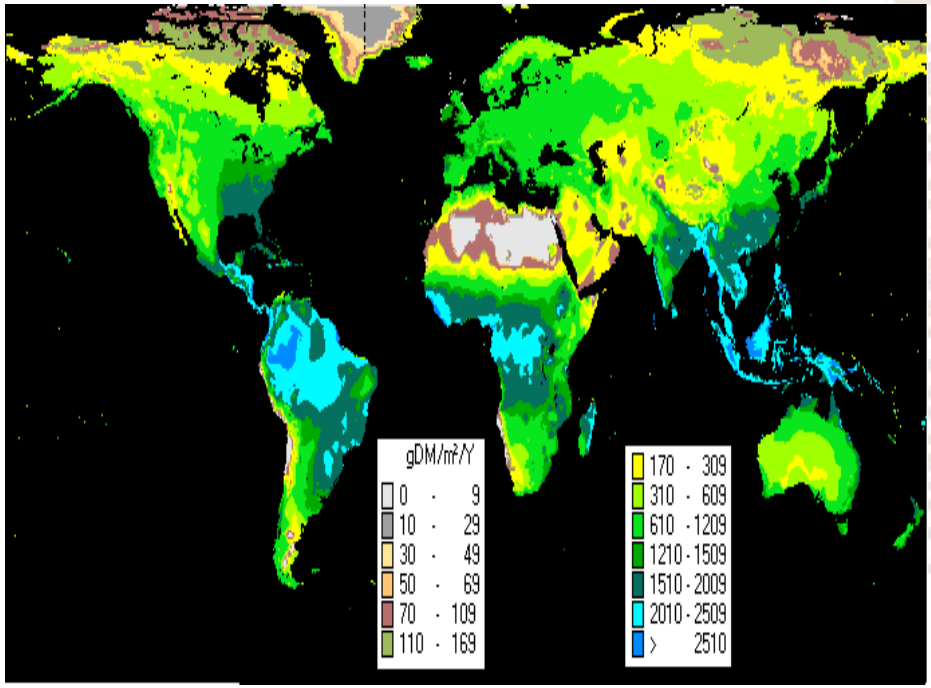
Advantages offered by Colombia

a- Colombia´s Comparative Advantages

- Permanent access to water resources.
- Pasture and foodstuff availability.
- Fourth largest beef herd in Latin America.
- Stable solar energy throghout the whole year.
- Access to Pacific and Caribbean Ocean coasts.
- Suitable agroecological conditions.
- Privileged geographical position for international trade.

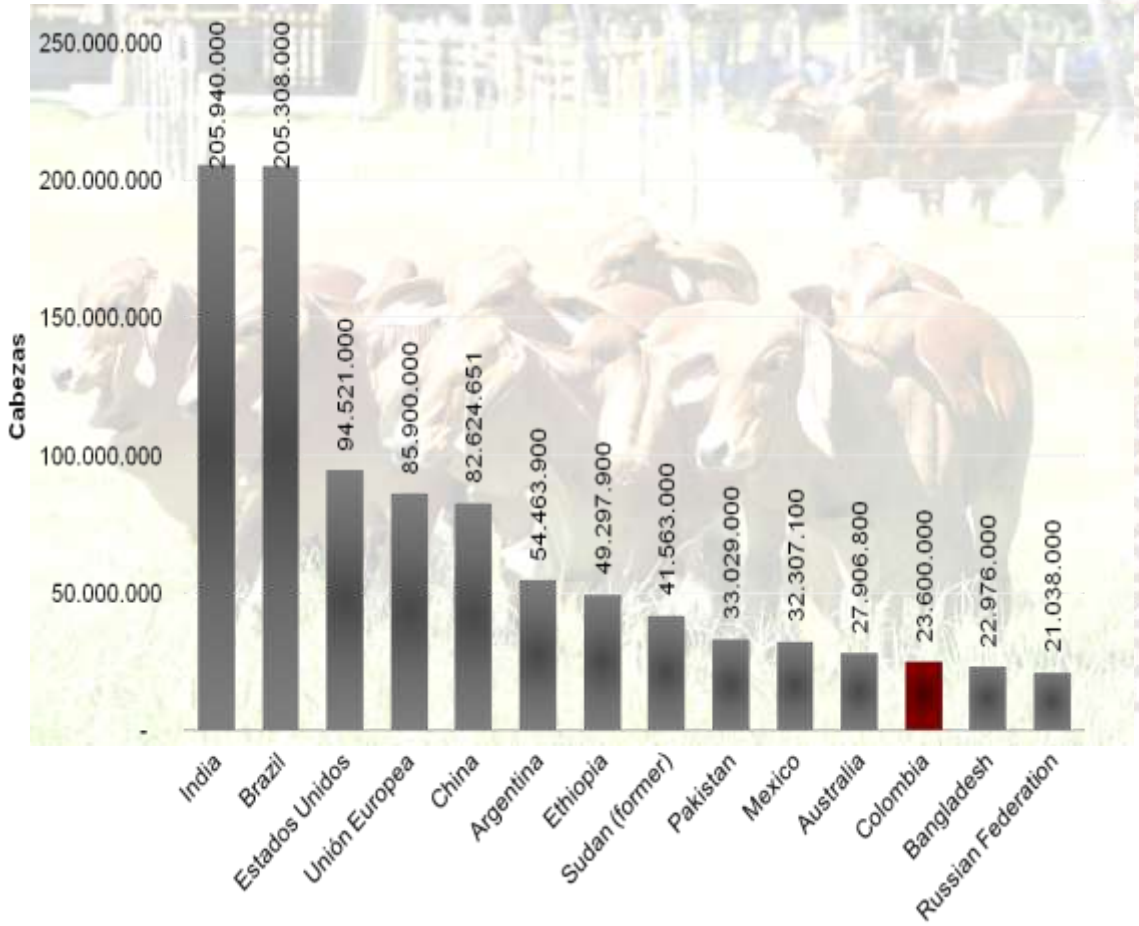
Biomass Energy Potential
(dry matter grams/m2/year)



Advantages offered by Colombia

b- Cattle herd size

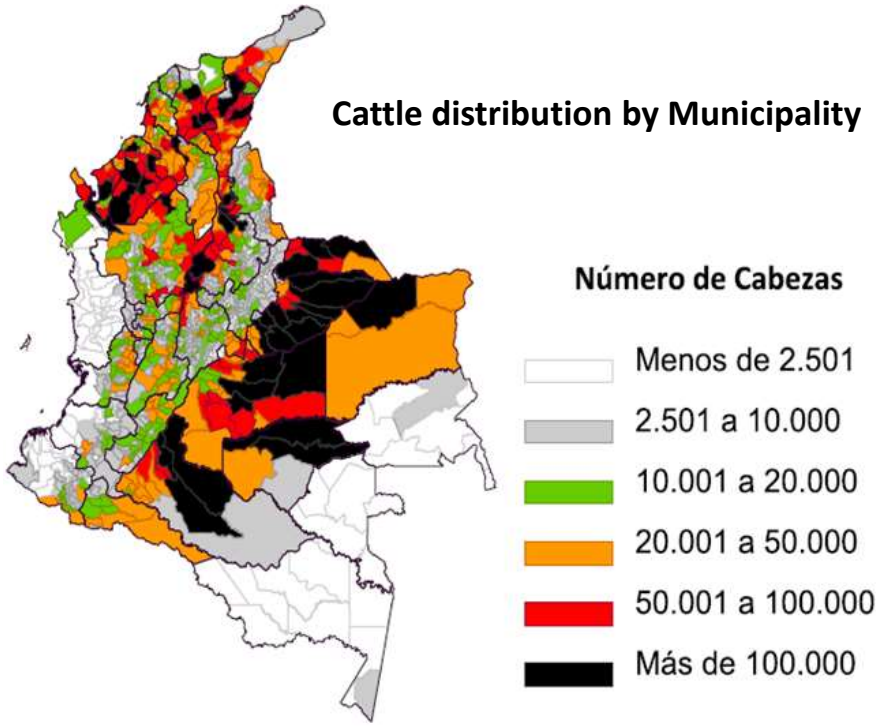
- **Colombia has the 12th largest beef herd in the world.**
- **The 5th largest in America and the 4th largest en Latin America.**
- **According to FAPRI´s projections, Colombia has a growth outlook in beef cattle production of 22% at least.**



Source: USDA – GIRA - Fedegán FNG

Advantages offered by Colombia

C- Spatial distribution of Cattle



- Cattle population and related activities are all arround the country.
- There are several regions specialized in beef cattle production: Costa Caribe, Magdalena Medio and Llanos Orientales.
- Specific regions are specialized in supplying domestic and external markets.

Source: Subgerencia de Sanidad y Bienestar Animal - Elaborado por: Oficina de Planeación - Federación Colombiana de Ganaderos – Fondo Nacional del ganado 2013

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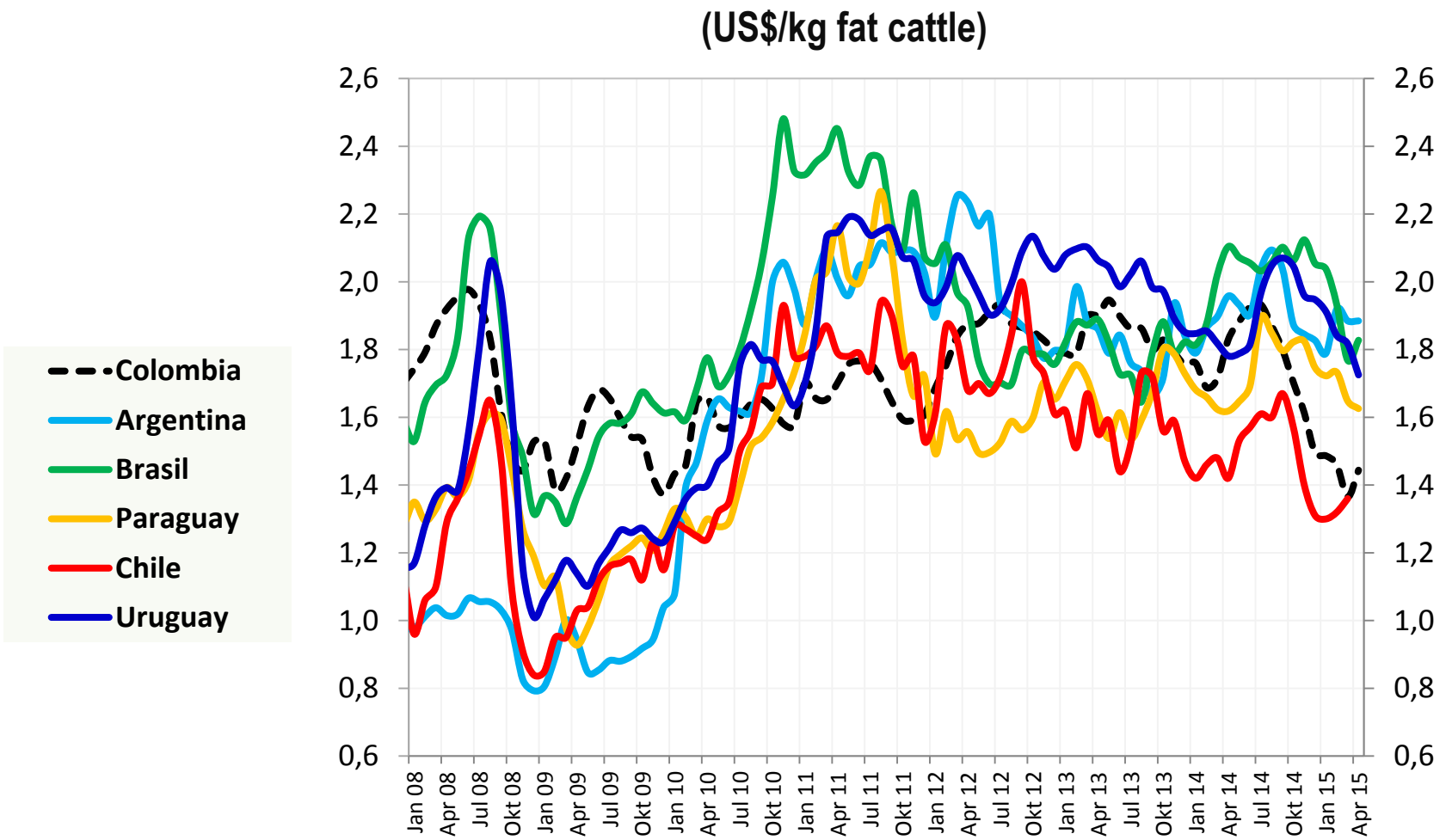
Advantages offered by Colombia

d- Gains in sanitary conditions of the cattle (breeder´s achievement)

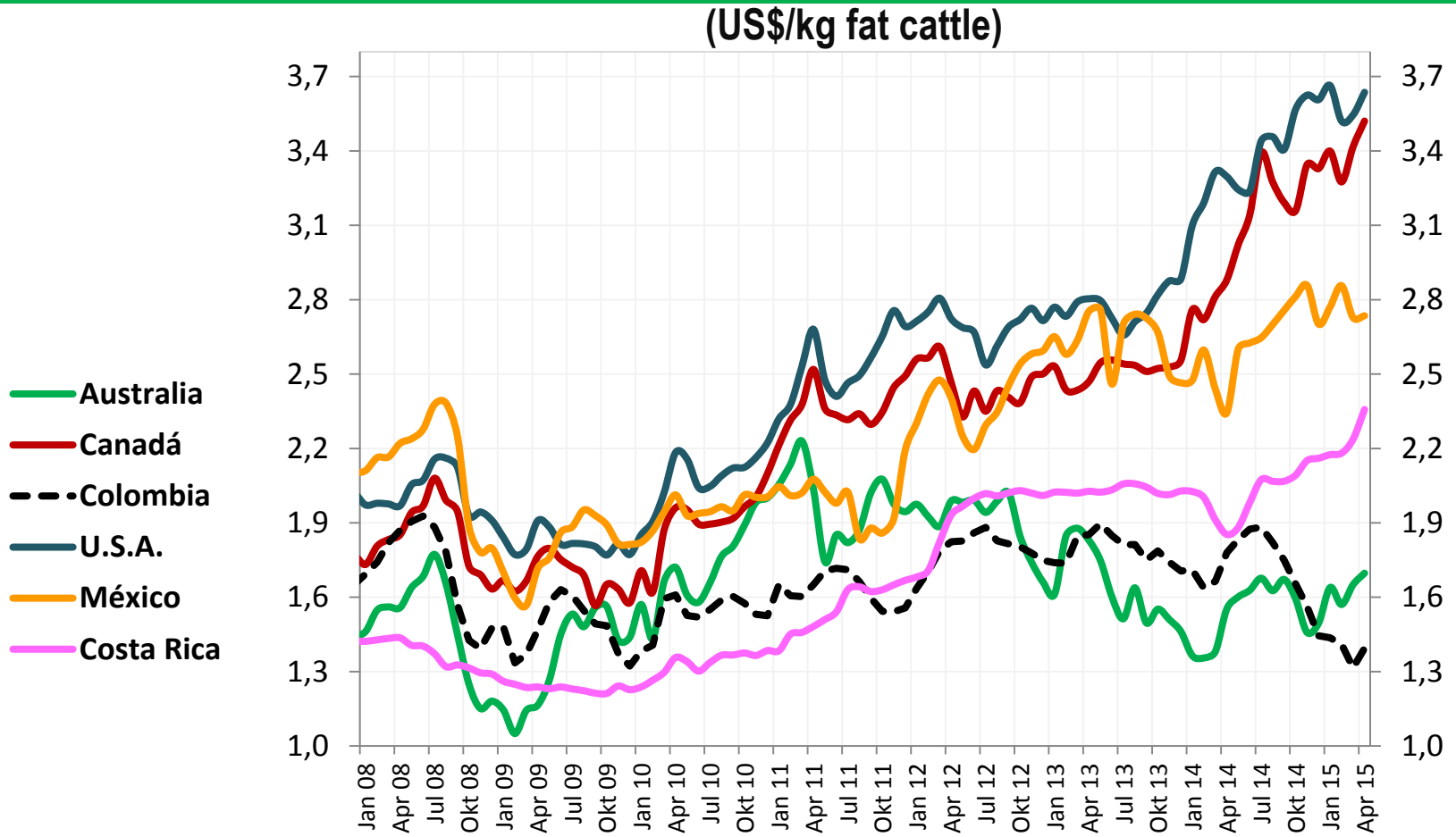
Sanitary Requirement	Current situation in Colombia
Foot and Mouth Disease (FMD) free with vaccination	Colombia is certified by OIE in 2009
Foot and Mouth Disease (FMD) free without vaccination	Two zones designated (Chocó and some Caribbean regions)
EEB	Insignificant Risk
Bovine Rabies	Controlled Risk
Bovine Brucellosis	Some zones
Hazard Analysis and Critical Control Points - HACCP	Some plants
Animal Welfare	Waiting for normative framework from beef importing-countries

e- Ability to compete in world markets, at the primary production stage



Source: SIGA. Calculations: Oficina de Planeación. Fedegan FNG

e- Ability to compete in world markets, at the primary production stage



Source: SIGA. Calculations: Oficina de Planeación. Fedegan FNG

Advantages offered by Colombia

f- Feeding based on pastures

Colombia´s privileged geographical position allows continuous access to pasture to feed the cattle throughout the whole year, without the use of hormones. Animals follow their natural life and fattening cycle and avoid the use of growth promoters.

These advantages allow the production of clean, biological and organic meat, highly demanded in international markets.

Advantages offered by Colombia

g- Predominance of Zebu cattle breeds: 75% of national herd

Zebu species are known for having the highest genetic quality worldwide. The systematic work on selection and genetic improvement has allowed the development of a breed with the best muscle masses, also with exceptional adaptability, productivity and business-profitability related conditions.

Colombia has approximately 38 million hectares for rising cattle; over 60% of them are in tropical areas considered as one of the most suited regions for the development of the Zebu breed.

La orientación del hato bovino colombiano es como sigue: Ceba (20%), cría (39%), doble propósito (35%) y leche (6%).

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Advantages offered by Colombia

h- Land availability

Colombian highlands have 4,5 million hectares available for agricultural and livestock farming activities. There´s potential to develop cattle ranching, cereal crops (corn and soybean), oil palm, forest and sugarcane plantations.

Having enough bovine feed supply would bring a positive impact on production costs and would make production of live animals even more competitive.

If 10% of colombian available highlands (450.000 hectares) were used in cattle ranching with 4 Cow Unit (UGG) x hectare, and if they produced enough bovine feed, those lands would produce 143.000 tonnes of dressed beef, 15% of internal beef supply.

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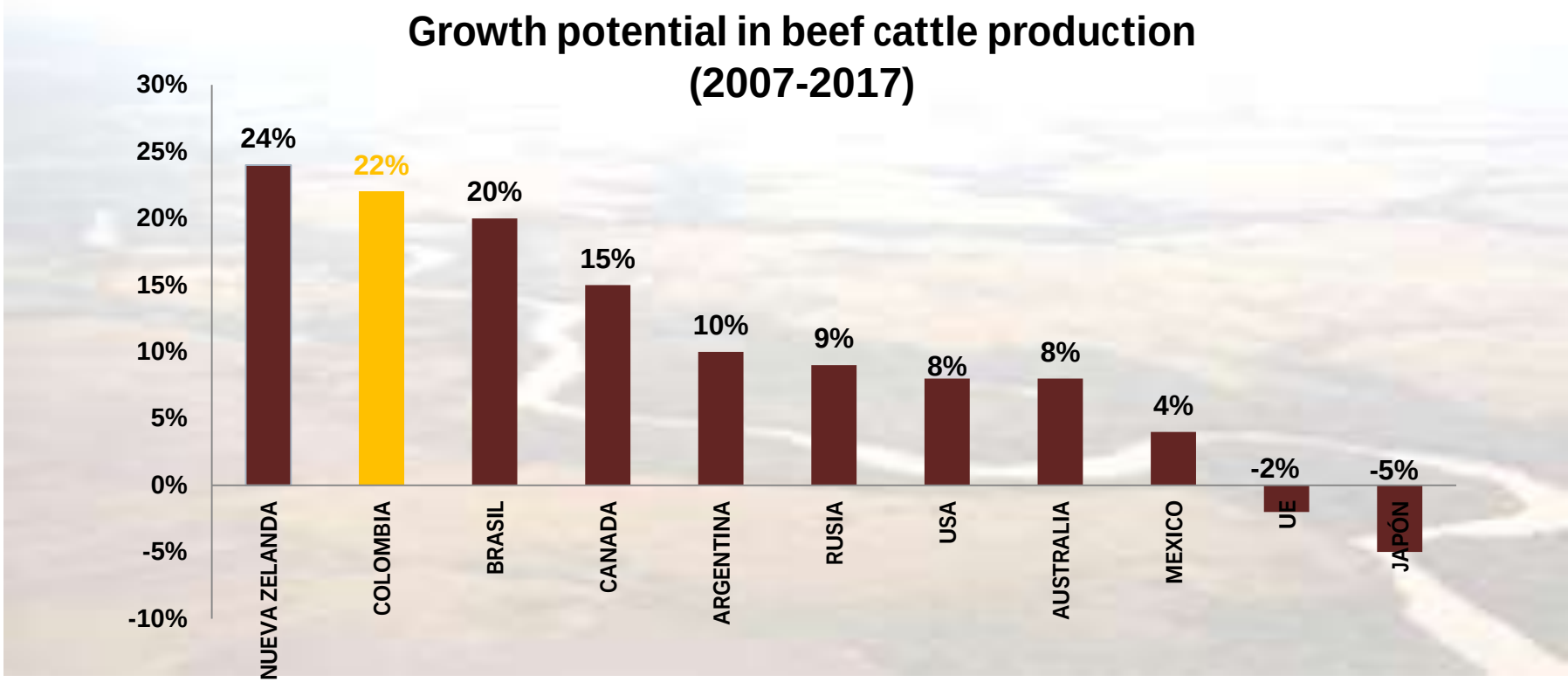
Advantages offered by Colombia

i- High growth potencial

Source: FAPRI – FEP FEDEGAN



According to FAPRI, Colombia´s beef production could increase 22% during the next decade; above the projected percentage for U.S.A., Argentina, Brasil, Canada or Mexico.

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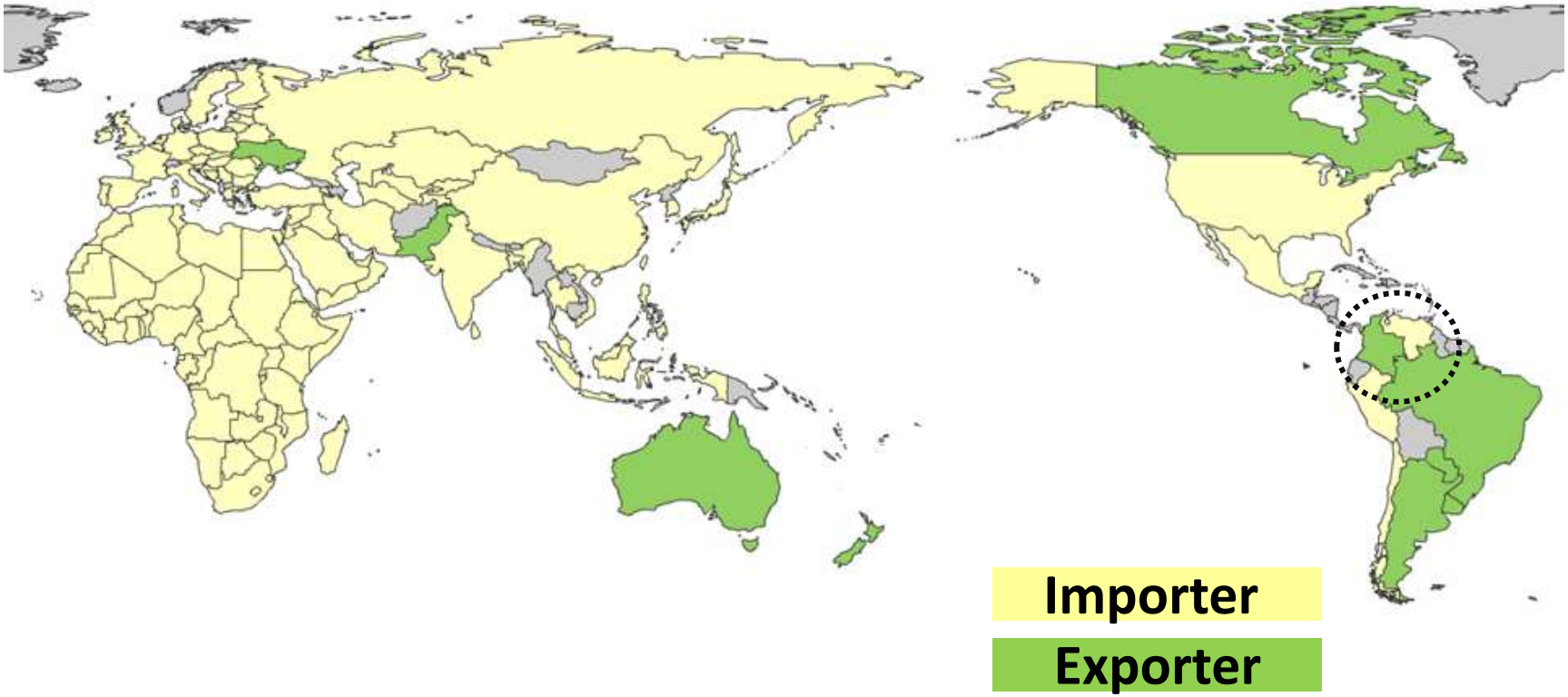
Advantages offered by Colombia

j- In 2014 Colombia began to be considered as a beef exporter country



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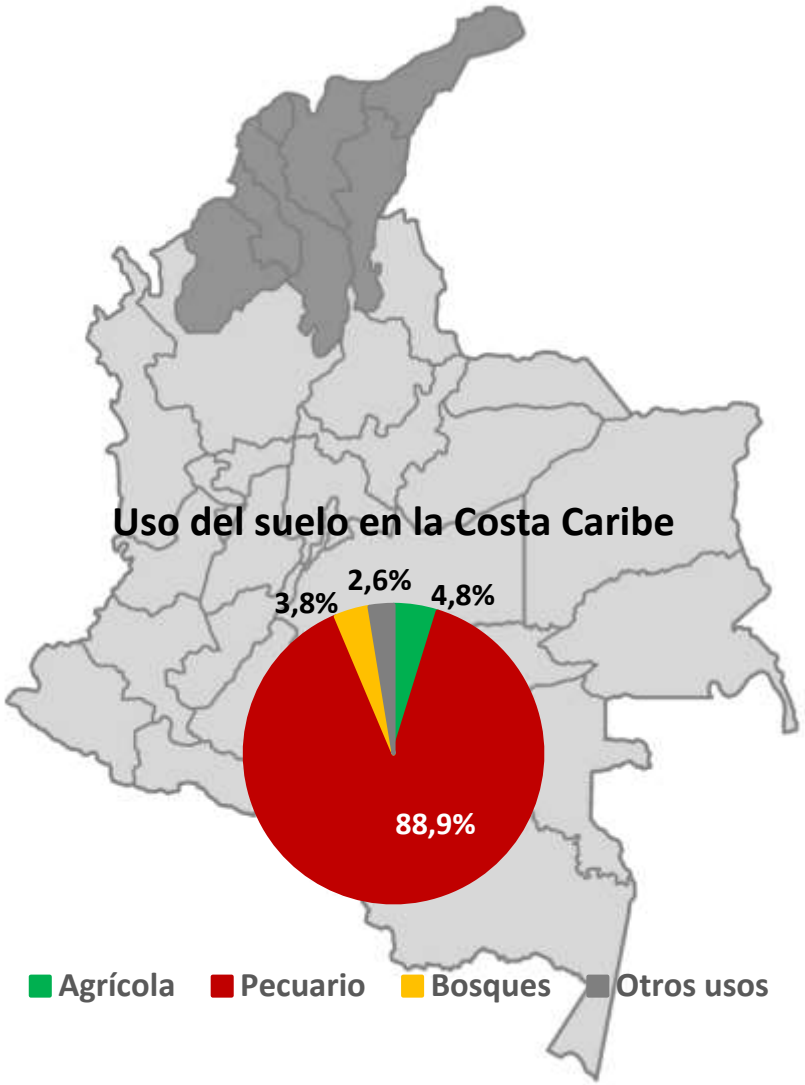
But, ¿what´s happening with profitability?

The case of dual purpose in the Caribbean region

The case of dual purpose in the Caribbean region



- Currently, 89% of total land at the Caribbean region is used for cattle related activities.
- Over 8,2 million hectares hold 7,1 million animals.
- Carrying capacity is approximately 0,87 animals per hectare.
- In the Caribbean region, 48% of total bovine cattle is concentrated on dual purpose activities, while 19% corresponds to fattening cattle, 32% to breeding cattle and 1% is specialized on milk production.

Source: Oficina de Planeación. Fedegán FNG

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Numbers of dual purpose in the Caribbean region

Dual purpose – Milk profitability	
Carrying capacity	1,1
Production (lts/cow/day)	4,1
Production cost of a liter of milk	$ 660 - US$0,25
Margin x liter	$124 - US$0,05
Sale price x liter	$ 784 - US$0,30
Liters /ha /Year	1.218 litros
Annual profit x hectare	$150.995 - US$58

Source: Oficina de Investigaciones Económicas - Fedegán FNG

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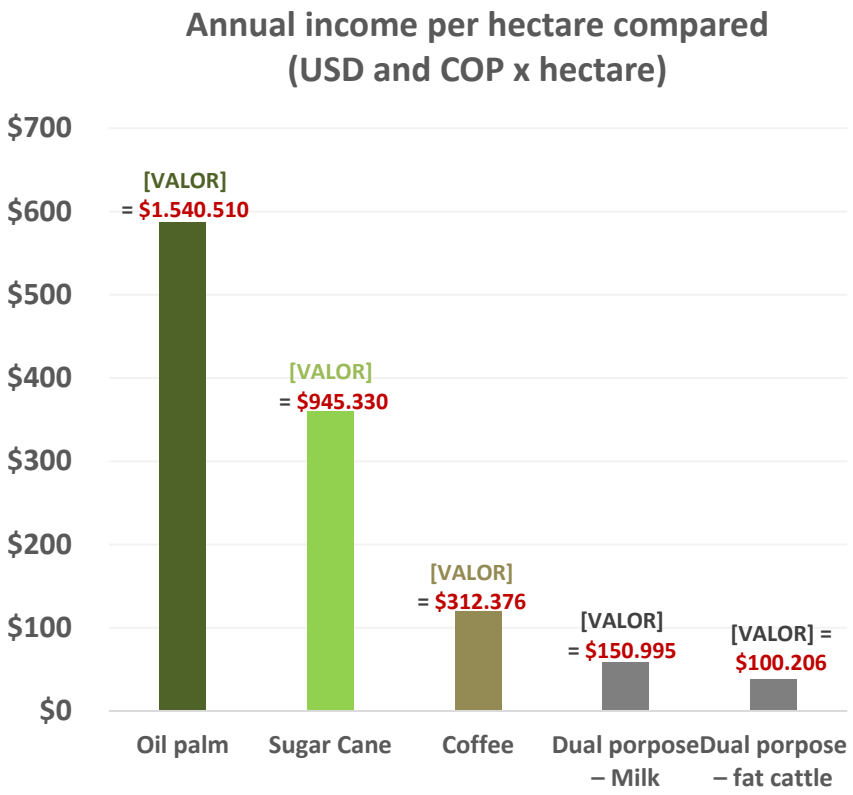
The numbers of dual purpose in the Caribbean Region

Dual Purpose– profitability in fat cattle	
Carrying capacity	0,9
weight gain per day	372 gr
Slaughter age	37 meses
weight in the Slaughter	426 kg
cost of production 1kg of beef (live animal in slaughterhouse)	$2.880 - US$1,1
Margin x kilo	$820 - US$0,31
Sale Price x kilo	$3.700 - US$1,41
kg /hectare /year	122kg
Annual income per hectare	$100.206 - US$38

source: Oficina de Investigaciones Económicas - Fedegán FNG



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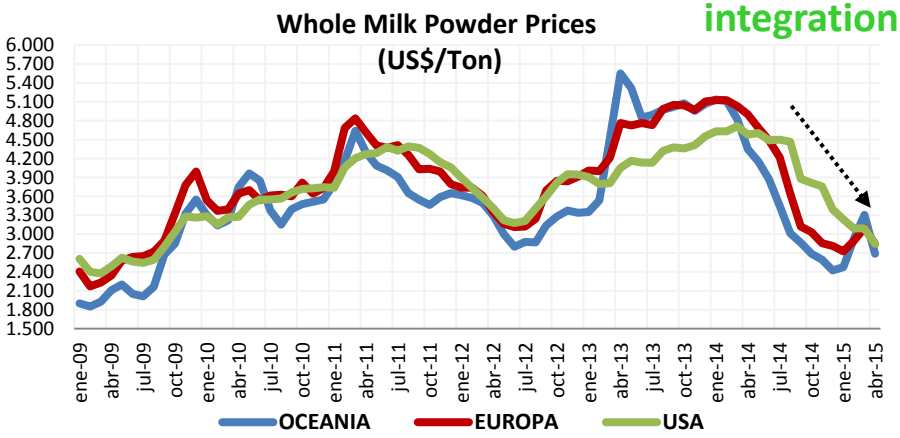
profitability compared

- The current dual purpose does not take advantage from production specialization, neither in milk nor in live animals.
- The rural sector's difficult conditions have forced to look for an activity that generates a certain level of income in a permanent way (the dual purpose)
- In most cases the dual purpose is developed by small cattle ranchers.
- Colombian cattle ranching is composed by 67% of owners who have fewer than 25 animals, making it difficult to develop economies of scale.
- Access to knowledge, technology, capital and credit is highly restricted to small cattle ranchers.

But in the case of milk production, the situation will be even more sensitive to issues of FTA and the integration into the international dynamics



- Better world prices in the beef, compared to milk prices
- increasing imports of milk via Free Trade Agreements
- decrease in milk profitability

THE MARKET WILL OBLIGATE :

- The restructuring of the production of many cattle ranchers will make them change to producing milk instead of beef.
- In milk, will stay the most efficient producers.

imported dairy products (Tonnes)

RUBRO	2009	2010	2011	2012	2013	2014	Ene-Mar 2015
milk powder	1.333	250	7.777	20.338	6.097	14.286	4.864
concentrated milk	157	19	56	1.968	16	740	408
evaporated milk	n.r.	n.r.	210	5	38	22	19
whey	5.979	4.077	5.367	8.395	7.335	9.487	2.991
cheeses	460	725	906	1.452	2.530	2.891	728
fluid milk	202	514	449	748	74	38	23
butters	89	4	2	69	166	38	2
Yogur – sour milk	13	17	14	122	58	99	35
Total Imports	8.232	5.604	14.781	33.097	16.314	27.600	9.069

Source: DANE – DIAN - USDA. Oficina de Planeación. Fedegán FNG

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¿Which is the alternative for a reconversion from beef cattle ranching to milk cattle ranching and make its production more profitable?

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Advantages offered by Colombia

Great potential for sustainable cattle ranching and silvopastoral systems

- Returned to nature 10,000,000 hectares.
- Sets 1,000,000 (hectares) in silvopastoral systems.
- No need to buy land.
- soil rehabilitation- It could be done throughout the entire national territory.
- The cattle rancher becomes a defender and promoter of the system.
- cattle ranchers increase the offset area by the benefits they receive.
- Increase productivity and profitability of the production system.
- Promotes the generation of environmental goods and services.
- It facilitates the release of fragile, marginal and strategic areas for ecological restoration.
- Research on biodiversity in agroecosystems and in different arrangements of SPS.
- It encourages the implementation of good farming practices and cleaner production.

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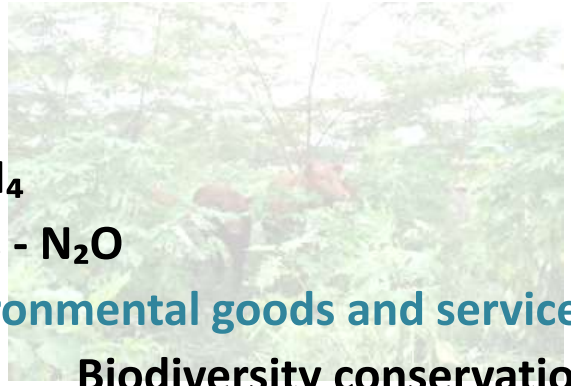
silvopastoral systems (SPS) benefits:



environmental improvement

CO_2 capture and Storage

Methane emission reduction - CH_4

Reducing nitrous oxide emissions - N_2O

environmental goods and services

Biodiversity conservation

Nutrient cycling

Increased organic matter in soil

Improvement in water quality

Source: Lopera, Cuartas y Murgueito

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silvopastoral systems (SPS) benefits:

Rate of carbon fixation SPS

- **Annual rates of carbon fixation in SPS vary between 1.0 and 5.0 t C / ha, depending on climate, soil, pasture type, species, density and age of the trees.**
- **Opportunity to tap into carbon markets.**

Source: Ibrahim, Guerra, Casasola and Neely (2010)
Importance of silvopastoral systems for mitigation of climate change and harnessing of environmental benefits.

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silvopastoral systems (SPS) benefits:

Climate change (adaptation) - Reduction of temperature

2°c - 3°c less than the average of the temperature annual

10% - 20% more than the average relative humidity anual

Productive benefits

- **Increase Carrying capacity average: 0.7 Cow unit (UGG) to 4 cow unit (UGG) x hectare**
- **Maximum utilization of solar radiation**
- **Increase biomass production**
- **Leguminous trees - nitrogen fixation**
- **High in protein**
- **Wood production for domestic consumption**

Source Lopera, Cuartas y Murgueito

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silvopastoral systems (SPS) benefits:

Access to water and water resources

No silvopastoral
2,190 Millimeters
annual evapotranspiration

with silvopastoral
1,530 Millimeters
annual evapotranspiration

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silvopastoral systems (SPS) benefits:

- landscapes with silvopastoral systems increase the biodiversity
- In the Silvopastoral project Approaches for Ecosystem Management, 193 bird species were observed, among which there are several for preservation

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silvopastoral systems (SPS) benefits:

SPS reduce the soil degradation and promote its recovery

Ranch: El Porvenir, Cesar, Colombia

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silvopastoral systems (SPS) benefits:

USDA certification and seal of quality "natural Beef Uruguay" outlined in the product label and in the boxes, the following attributes:

- **No added hormones**
- **No added antibiotics**
- **No use of animal protein**
- **With grass-fed animals**
- **traceable**
- **With proper handling of animals**

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The numbers and realities of cattle ranching with silvopastoral systems

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Silvopastoral Systems (SPS) Numbers

- **To produce 10 Tonnes of Beef (live animal) 150 000 hectares of land in extensive grazing are required, they also have a negative balance of CO2 emissions – Equivalent (more than 48.000 tonnes).**
- **However, if the same amount of beef (live animal) occurs with the silvopastoral system, it requires only 12 thousand hectares that besides, gives a balance in Greenhouse Gases**

Murgueitio et al, 2012

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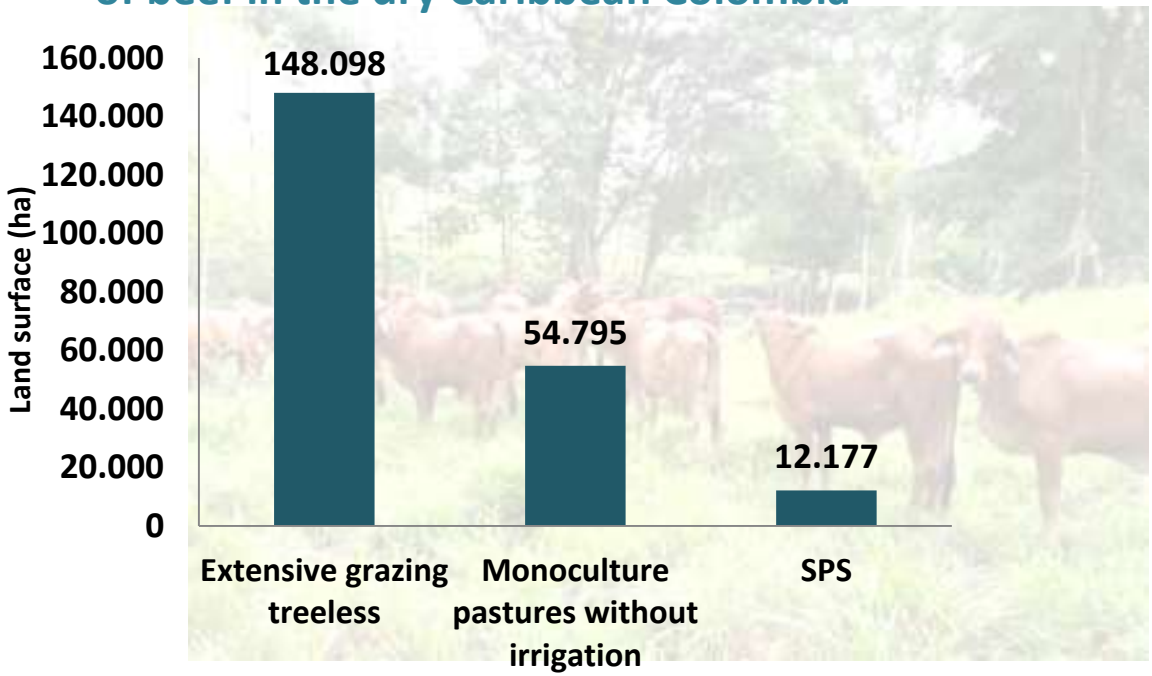
Silvopastoral Systems (SPS) Numbers

Land area required for the annual production of 10,000 tonnes of beef in the dry Caribbean Colombia



Calle, Murgueitio y Chará

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Silvopastoral Systems (SPS) Numbers

Milk quality in SPS in the valley of Cesar river, Colombia

Kg/ha/Year				
Milk quality	Fat	protein	Nonfat solids	total solids
SPS	294,2	188,7	499,5	793,7
Traditional	49,4	37,9	103,4	152,9

Ranch: El Porvenir Codazzi, Cesar

Rivera, Cuartas, Naranjo, Córdoba, Murgueitio y Barahona.

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Silvopastoral Systems (SPS) Numbers

Land productivity in both systems.

	Animals/ha	UGG/ha	Lts/ha/Year
SPS	4,1	3,6	5.578
Traditional	1,1	0,9	1.218

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Silvopastoral Systems (SPS) Numbers

Methane emissions in 3 production systems in Colombia

Item:	conventional pasture	Improved pasture	Intensive silvopastoral system
Carrying capacity (UGG/hectare)	0,5	1	4
Daily gain/ animal (kg)	0,37	0,5	0,75
Daily gain/ hectare (kg)	0,185	0,5	3
Fattening days/(from 250 to 440 kg)	514	380	253
kg of beef X hectare / Year	67,5	182,5	1095
Kilos of methane X tonnes of beef produced	229,5	208,5	127,9
Hectares needed X tonnes of beef / year	14,8	5,5	1,1

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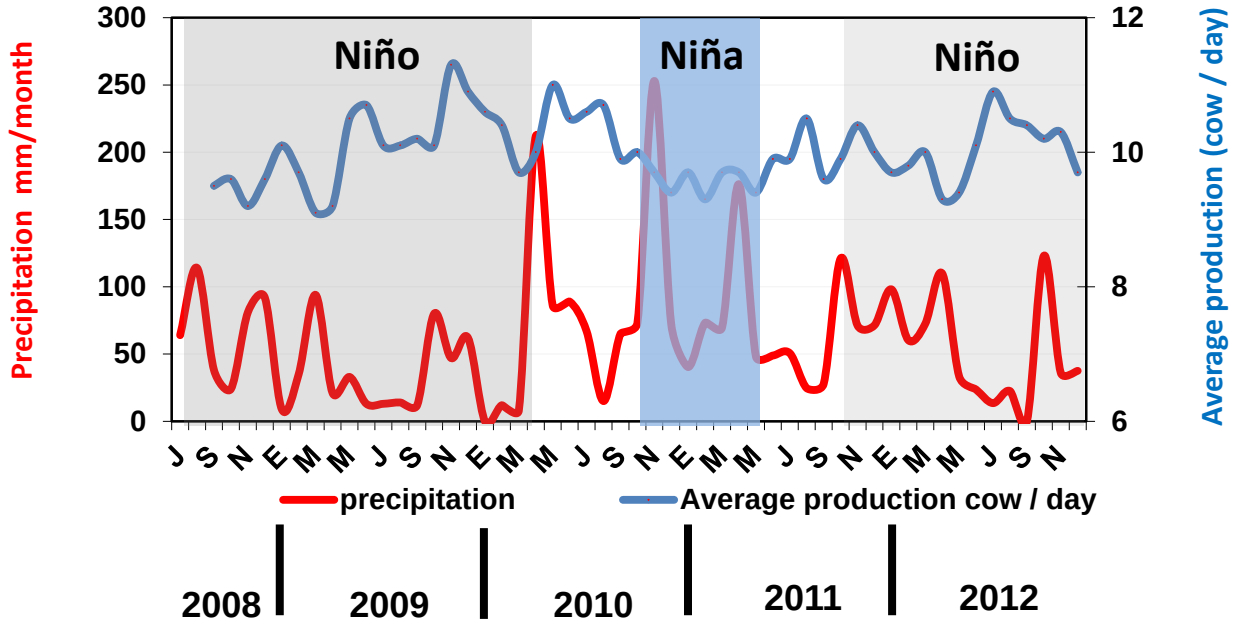
Silvopastoral Systems (SPS) Numbers

The forage supply is more stable during extreme weather events = more constant production



Molina EJ; Molina C. Hernando; Molina C.Hernán

Reserva Natural El Hatico

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Comparative numbers of traditional dual purpose and SPS in the Caribbean region

Dual purpose – Milk profitability		
Item	**Traditional System**	**Intensive silvopastoral system**
Carrying capacity	1,1	4,1
Production (lts/cow/day)	4,1	10,2
Production cost of a liter of milk	$660 - US$0,25	$594 - US$0,22
Margin x liter	$124 - US$0,05	$190 - US$0,08
Sale price x liter	$784 - US$0,30	$784 - US$0,30
Liters /ha /Year	1.218 litros	5.578 litros
Annual profit x hectare	$150.995 - US$58	$2.145.366 - US$817

source: Oficina de Investigaciones Económicas - Fedegán FNG

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Comparative Numbers of traditional dual purpose and SPS in the Caribbean Region

Dual purpose– profitability in fat cattle		
Item	**Traditional System**	**Intensive silvopastoral system**
Carrying capacity	0,9	4,1
weight gain per day	372 gr	752 gr
Slaughter age	37 Months	23 Months
weight in the Slaughter	426 kg	452
cost of production 1kg of beef (live animal in slaughterhouse)	$2.880 - US$1,1	$2.025 - US$0,77
Margin x kilo	$820 - US$0,31	$1.675 - US$0,64
Sale Price x kilo	$3.700 - US$1,41	$3.700 - US$1,41
kg /hectare /year	122kg	1.096kg
Annual income per hectare	$100.206 - US$38	$1.835.800 - US$699

source: Oficina de Investigaciones Económicas - Fedegán FNG

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The potential of the Caribbean Region

If we allocate 200 000 hectares in the Caribbean Region, which today are found in traditional activities dual purpose, to beef production in silvopastoral systems, we will have:

- **In those 200 000 hectares 132 000 tonnes of dressed beef (219 thousand tonnes of live animal) would occur.**
- **132 000 tonnes of dressed beef is equivalent to 14% of total production.**
- **To produce all the dressed beef of Colombia in 2014 (960 thousand tonnes), only 2.1 million hectares would be needed in silvopastoral system.**
- **To reach the goal of 2023 in which Colombia produces 2.5 million tonnes, the SPS play a key role.**

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SSPi, (Cesar), Dry Caribbean Colombia
Baseline, rainy season, in April 2011.
The lowest production in 25 years
Ranch: La Luisa – Codazzi (Cesar)

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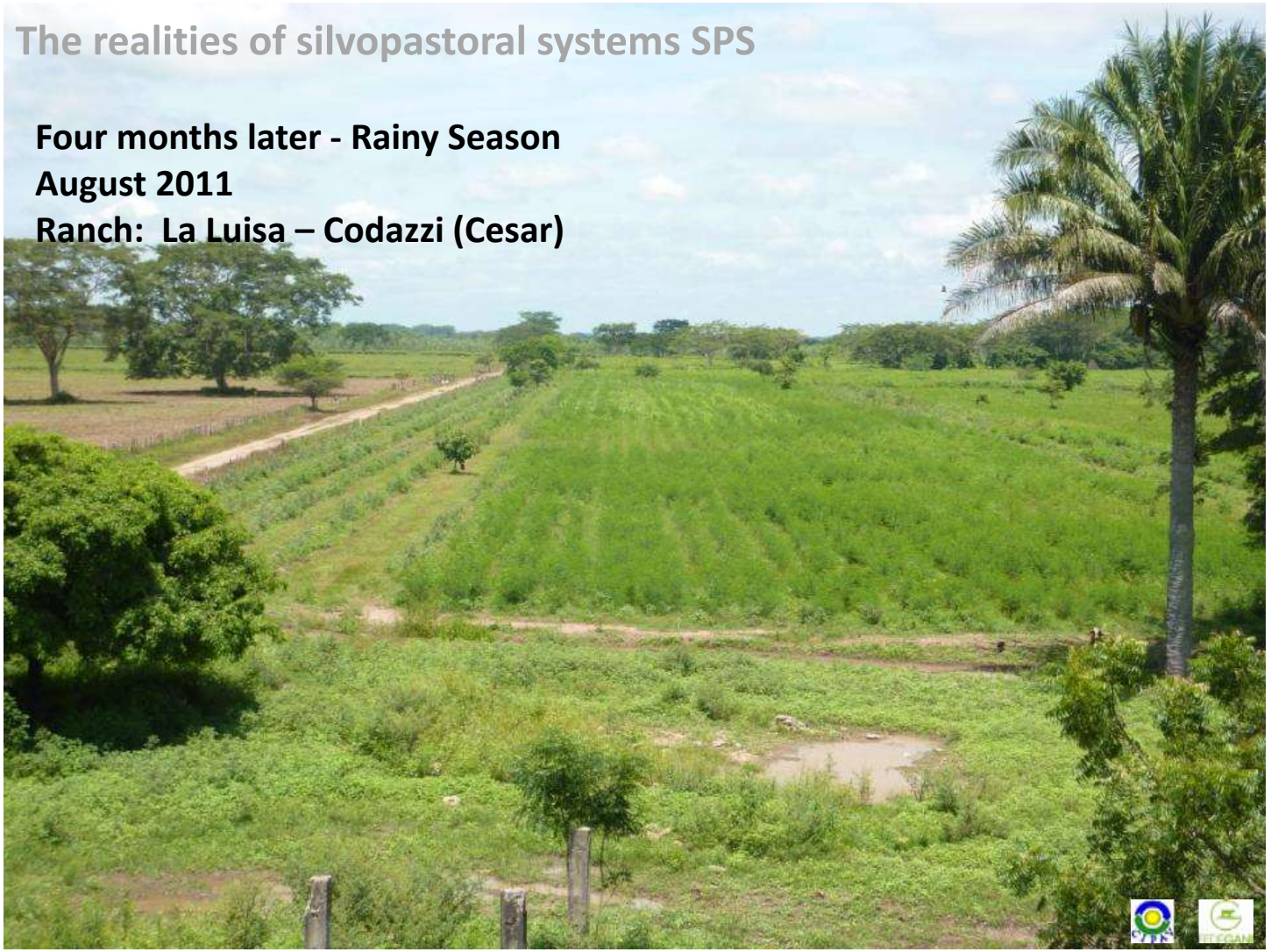
The realities of silvopastoral systems SPS



The realities of silvopastoral systems SPS

Nine months later - Dry season
January 2012
Ranch: La Luisa – Codazzi (Cesar)

The realities of silvopastoral systems SPS

The realities of silvopastoral systems SPS

A year and a half later
December 2012
dry season
Ranch La Luisa – Codazzi (Cesar)

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The realities of silvopastoral systems SPS

May 2015

Ranch La Luisa – Codazzi (Cesar)

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The realities of silvopastoral systems SPS

May 2015
Ranch La Luisa – Codazzi (Cesar)

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Conclusions:

- **The dynamics of protein's worldwide consumption, has potentiated beef as one of the products with a high demand increase.**
- **The growing but insufficient offer of beef will maintain the prices in a high tendency**
- **Colombian cattle ranching currently has big production opportunities, but it has to be focused on a higher profitability productive model to make the business sustainable.**
- **The SPS propose an opportunity to transform Colombian cattle ranching in environmental, profitable and productive topics.**
- **A public policy impulse on topics related with sustainable cattle ranching and SPS is indispensable, taking into account its wide range of benefits but also the necessary investments.**

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THANK YOU

JOSÉ FÉLIX LAFAURIE RIVERA
Executive President

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