

# Fine Cocoa Attributes,

# **New Fermentations and**

# **By-Products**

Bertus Eskes and Dario Ahnert Fine Cocoa Inventors/Consultants



Phenomenal Cocoa & Chocolate Delicacies

The Magie of Reality





My Presentation = My Book

Freely Available at:

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#### **Bertus Eskes, Holland/Brazil**

- 1971 2016Geneticist of coffee and cocoa, Brazil/France<br/>Projects in 12 cocoa producing countries
- 2008/09 Initiator of "Cocoa of Excellence (CoE)" competition, France

2001/11



#### **Cocoa Farmer** in Bahia

- 2007 Discovers the relationship between pulp flavors and aromas and fine-chocolate attributes
- 2009 *European patent on fermentation of cocoa with aromatic substances ("TropMix" method)*
- 2015/20 Fine flavor Surveys in Peru and Brazil
- 2019 Anima Fermentation Technology
- 2021 Tradima Fermentation Technology
- 2021 "Phenomenal Cocoa" Book



Cocoa and Me: 52 Years of Marriage

# "Love is to be Paid for by Love"



# 1. Flavors and Aromas in Cocoa Fruits

# 2. New Fermentations

1. 3. New Fine By-Products





#### **Fine Atttributes**

### **1. Fine Cocoa Attributes**

### Other Sensory Attributes than "Cocoa" Flavor (ICCO)





# **Origin of Fine Flavor Traits**

> Fermentation: Nutty

Pulp: Citric Acid, Sweet, Fresh and Mature Fruit, Floral, Spicy



# Fine Flavor Traits Derive 5/6th From the Pulp



# Our Objective: Study Cocoa Pulp Flavors and Aromas



# These have Been Little Studied so Far



Pulp Flavors and Aromas Determine Fine Chocolate Traits (Eskes et al. 2009, 2012)

- Fine-flavor cocoa countries grow cocoa varieties with *nice pulp*, eg. Trinidad TSH varieties
- Aromatic substances added during fermentations are incorporated into beans and chocolates (TropMix, 2009)



Pulp and chocolate sensory traits of traditional fine-flavor cocoa varieties *are related* 



#### Traditional Fine Flavor Cocoa varieties (4 flavors and 2 aromas)

Variety	Pulps	Chocolates
Criollo	very sweet	caramel
Trinitario	citrus/lemon	fresh fruit
Nacional	jasmine, herbal	floral, herbal
	fruity	fruity
Scavina 6	grape, lilv	raisin. floral



Genetic Pulp and Chocolate traits are related



#### **Oportunities**

- 1. Rapid identification of new fine cocoa varieties by evaluation of pulp flavors and aromas (genetic variation)
- 2. Modification of chocolate flavor and aroma by *adding aromatic substances* during fermentation (*naturally induced variation*)





# Genetic Variation for Fine-Flavor Cocoas

# T.cacao: All that is Good should be Simple





#### The nose to identify the aroma







#### The *mouth* to identify the *flavors*







## **Genetic Surveys**

Eight surprising new pulp sensory traits identified in different countries between 2007 and 2012

**Example:** 

« Banana Cocoa » Tree in Trinidad
"This chocolate with intense banana jam flavor
persists long time in the mouth"
(Bertus Eskes)

Expressive Pulp Flavors Become Expressive Chocolate Flavors





#### Survey of Native Chuncho 2015/16, Cusco, Perú 226 Old Chuncho trees, used for juices







# Survey of 48 Brazilian « bulk » varieties









### Chuncho and Brazil Pulp Survey Eskes *et al.*, 2018

#### • 29 Fruit Flavors

citrus, mandarin, tangelo, jack fruit, annona, soursop, custard apple, 5 bananas, grape, green apple, dry apple, roseapple, guava, cranberry, mango, inga, peach, plum, honey, raisin, red mature fruit, red fresh fruit, yellow fresh fruit, fruity, mangosteen



#### • 14 Aromas (Floral and Spices)

*rose, jasmine, lily, floral, heavy floral, spicy, cinnamon, vanilla, mint, yeast, basil, malt, violet and licorice* 



### **Peru and Brazil**

- 73 Unique Sensory Profiles, eg.
  - tangelo/jasmine, lemon/jasmine, banana, mandarin/jasmine, lily/rose, soursop/rose, mango/rose, roseapple/floral, mint/jasmine, cranberry/rose, nuts/rose, mango; custard apple; lnga; lnga/floral; citrus/yeast; mangosteen, citrus/banana (var. lsla); citrus/rose/jasmine; basil; mint/floral; malt/jasmine; mint/jasmine; nuts; mint/nuts/lily; peach/jackfruit; etc.





### **Perspectives**



> Peru:

Chuncho Used to be « Bulk » Cocoa just 10 Years Ago

Increased Commercial Interest in fine-flavor/aroma Chuncho

**Eg. Location with pure Rose Aroma** 



### **Perspectives**

#### > Brazil:

- Mainly bulk cocoas with traditional fermentations
- Flavor/aroma diversity of just 48 varieties is 50% of Chuncho
- Need to extend survey
- Potential to produce fine flavor cocoas in Brazil is enormous

Need for a fine-flavor fermentation method to realize potential!





## Example of Fine Flavor Selection

Hybrid cocoa in Bahia, Brazil

- 40 trees with divers flavor/aroma profile
- 20 trees with excellent profiles
- **Examples:**

Peach/Lily Acid Apple/Lily Lime/Jasmine Mango/Rose Muscat Grape/Lily Herbal Mango/Cumin









#### **Cocoa Sensory Identity Symbol**

#### **Both Mimick Interesting Far-Away Attributes**







#### **Cocoa Sensory Associations**

### **Between Sensory Traits**

With other Traits





### **Cocoa Sensory Associations**

- Citrus/Jasmine
- Mandarin/Jasmine
  - **Tangelo/Jasmine**



Probability by chance = 0.001 Not accepted at P=0.05



#### **Cocoa Sensory Associations**





#### **Cocoa Sensory Associations**





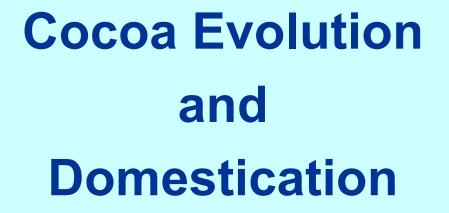
#### **Cocoa Sensory Associations**

#### Normal vs. Soursop Cocoa Beans





# How to Explain 43 Fine Flavors and Aromas and 31 mimicked attributes in *T.cacao*?





### **Evolutionary role of frugivore animals in Cusco, Peru**





# What is good for one monkey is also good for the other monkey!









Native *Matsigengas* = domesticators that

pre-historically consumed cocoa pulp and beans

in Cusco and sold beans to the *lncas* 







# Genetic sensory expression of *T. cacao* vs. other fleshy fruit species





### **Genetic expression of Sensory Traits**

Т. сасао	Other fruits
Expresses 73 sensory profiles	<i>Express one sensory profile</i> (an apple is always an apple)
<i>Qualitative Expression of 43</i>	<i>Quantitative Expression of</i>
<i>Traits</i>	one Profile
Simple pleiotropic	<i>Complex</i> inheritance
inheritance	(tomato: 100 QTL)

Selection for fine cocoa varieties is easy!





**Phenomenal Cocoa** 

## Hypotheses (Eskes 2021)

- 1. Cocoa maybe SuperNatural, as the Incas that consumed cocoa?
- 2. Sole Scientific Explanation: « T. cacao Loves Human Beings »





#### **Phenomenal Cocoa**

## Recommendations

- 1. Carry out selection of new varieties for interesting pulp sensory profiles
- 2. Carry out more surveys of pulp sensory traits in many cocoa producing countries
- 3. Relate interesting pulp sensory profiles with chocolate profiles using fine cocoa fermentation methods
- 4. Compare volatiles of cocoa pulp, eg. Rose, with the true Rose volatiles.





#### **Phenomenal Cocoa**

## Discussion Fine Cocoa Sensory Diversity





#### **Fermentation Methods**

## New Fine Cocoa Fermentation Methods

TropMix
Anima Child
Anima Adult
Tradima





**Fermentation Methods** 

## **Objectives New Fermentation Methods**

## Zero Bitterness, Acetic Acidity and Astringency



Fine Flavors Well Expressed



#### TropMix: Addition of aromatic substances during fermentation



#### • EU patent, 2009

- > With Cupuaçu and Soursop
- Excellent chocolates tested in France
- > 100 TropMix fermentations in Brazil (2015-21)
- Regional aromatic products can be valorized in « terroir » chocolates



## TropMix

- 1. Fruit pulp or Spices Added
- **2**. Traditional fermentation:

becomes longer, more bitter and astringent

**3.** Best association of TropMix is with Anima





# Example of bulk cocoa Amelonado transformed with TropMix/Anima (Brazil)

Treat- ment	Days	Acidity	Bitter- ness	Astrin- gency	Nutty	Fresh fruit	Mature fruit	Spicy	Floral	Prefe- rence
Farmers control	7	0	3	3	0	0	2	0	0	5
Clove and cinnamon	3	0	3	1	2	0	0	8	5	9
Jackfruit	6	2	1	1	3	3	6	3	0	10
Cupuaçu	4	0	2	1	4	2	6	2	6	10

Large variation induced for fine-flavor traits!

Amedei loved the Cupuaçu TropMix



# Example of bulk Vietnam cocoa varieties flavored with Durian pulp (Cambodja)

***I *** ③ ● ♥ ● * ● * * 0 / 46% ■ 13:05	Treat- ment	Days	Acidity	Bitter	Astring.	Cocoa	Nutty	Sweet	Fr. fruit	Mat.fruit	Floral	Prefe- rence
WHEN CACAO AND DURIAN	Durian	4	4	0	1	4	6	6	10	3	4	10+ +
ARE TOINING FORCES		<pre>+</pre>										



## **TropMix Potential**

 Unlimited Variation for Flavors and Aromas
Large potential for Regional « Terroir » Products



## **But TropMix**

Not accepted in international cocoa competitions!

While 80% of Fine Chocolates

Have Inclusions or Flavorings!



This means Injustice to the

Farmers!



#### ValRhona Double Fermentation « Invention » (2016)

- = TropMix Fermentation at 4 Days!
- Passion Fruit and Oranges (2016)
- > No Reference to my Patent, but
- At Least Shows Commercial Validity of TropMix

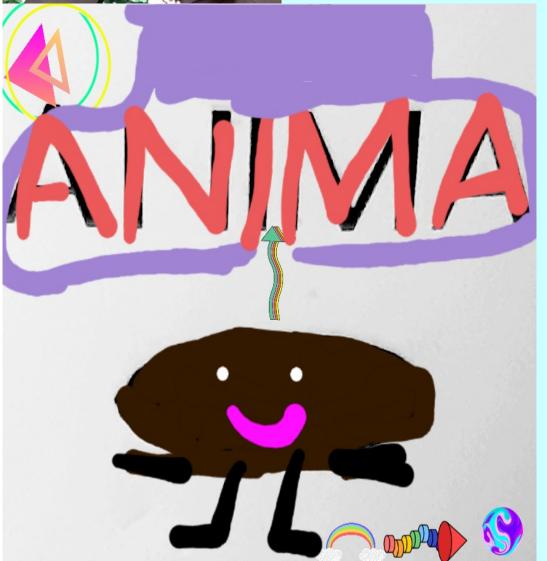


# Other New Fermentation Technologies

(Experimental/Commercial)







## "Anima" (= Soul, Spirit of the Forest)

## **Fermentations**



## "Anima Child"

2015-2018





## Protocol of my First Anima Fermentation (2015)

- Small Boxes
- Three Steps: 1 Before and 2 During
  - **Fermentation**



- Steps: 1-2 Preference Points (0-10 scale)
- Total 9-10 points
- Traditional Control = 5 points



**CoE Award: 2017** 

Limitation: Good for Small Quantities Only

Less than 12-16 litre boxes for adequate aeration





#### **Anima Adult Fermentations**

## "Anima Adult"

## 2018





## **Adult Anima**

## **Fermentations (2015)**

- Small, Medium and Big Boxes
- > Two Steps: Before and During
  - **Fermentation (Aerobic)**
- One and 3 Preference Points
- Total 10 points





#### SuperNatural Cocoa

#### **Anima Duration of Fermentation**

Tw		81	91	91	101	101	101	119	117	127	121	13¶	13¶	14¶	15¶	Þ
TĦ	8¶ 9h#	218h¤							16h¤	8h¤	16h¤	8h¤	16h¤	8h¤	8h¤	
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9=	a	α		42¤		42¤		30¤		72hg	a	æ	n	æ		¤
10¤	α	a				44¤					86h¤	¤	æ	x		¤
11¤	a	æ				47¤			44¤	45¤	45¤	43¤	35¤	120¤		
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#### **Adult Anima Fermentations**

## Uniform Anima Beans

- \* No bitterness nor astringency
- Little blooding
- \* 95% cotyledon openings
- \* All uniform taste
- \* 100% Fermented
- \* PH 6-6,2
- \* Need protection against mold (with vinegar)



#### **Discussion Anima Technology**

- ► The *Anima* fermentations counterdict secular *dogmas* of cocoa fermentation!
- The Aerobic Condition is the Main Fermentation Step
- End of Fermentation is Determined by *Tasting* in stead of the *Cut-test*
- Cheap and Simple Method





#### **Adult Anima Fermentations**

#### **Adult Anima Beans Compared to Control**

Treat- ment	Days	Acidity	Bittern.	Astring.	Honey	Nutty	Fresh fruit	Mature fruit	Floral	Aftertaste	Prefe- rence
Farmers control	7	3	4	3	0	0	0	2	0	5	5
Anima Amelo- nado	3	0	1	0	4	4	3	3	3	8	9
Anima CCN51	4	3	2	1	3	4	6	2	3	9	9
Anima CEPEC	4	0	1	0	5	5	0	8	5	10	10+





#### **Other Anima Assessments**

# "I hated chocolate. But Anima is fantastic"

(First Anima chocolatier in Africa, 2021)



"The most balanced chocolate I ever tasted. Can be universally pleasing to any palate" (Young chocolatier in Brazil, 2023)



#### **Anima Potential**

Anima fermentations transform bulk cocoas into fine-flavor cocoas!



Worldwide potential for cocoa quality improvement is unlimited!



## **Commercial Features of Anima**

- More than 200 Experimental and 500 Commercial Anima fermentations done in Brazil
- Anima chocolates made by Domori sold better
  - than 9 other fine cocoa origins in France (2020)
- Anima International: Brazil, Peru. Colombia,
  - Ivory Coast, Cameroon, Cambodja and Thailand







Cocoaian Company Abidjan (2022)

- ► 200 Farmers
- ► 100% Anima
- Produces chocolate and other cocoa

products in Abidjan

► Sells to Belgium





## **Anima Awards**

Two Brazil Two Peru Two Paris



**Adult Anima Fermentations** 

## **Anima Recommendations**

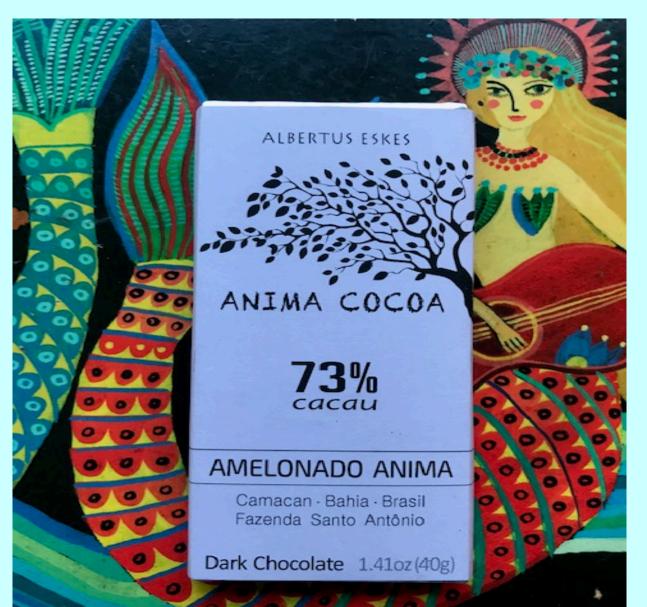
- Associate Anima with local or regional processing because Anima beans can become stressed by travelling (is being studied)
- Regional Anima-TropMix excellent approach for exploring "terroir" effect







#### The End of the Beginning of Anima





## Anima Alternative: Tradima Fermentations

(Traditional x Anima)





### **Tradima Steps**

- > 5-7 days pod storage
- Traditional Fermentation (3-4 days)
- Additional Fermentation Step
  - (reduces acidity and bitterness)





#### **Examples of Tradima**

Treat- ment	Days	Acidity	Bittern.	Astring.	Honey	Nutty	Fresh fruit	Mature fruit	Floral	Aftertaste	Prefe- rence
Farmers control	7	3	3	3	0	0	0	2	0	5	5
Tradima 1	6	2	3	1	4	4	4	4	8	9	9
Tradima 2	5	2	0	0	4	4	0	6	5	9	9
Tradima 3	6	0	1	0	6	6	0	8	6	10	10





#### **Tradima Technology**

- ► 100% without acidity and bitterness
- Fine cocoa traits are well expressed (eg. fruit, floral)
- Quality comparable to Anima





#### Recommendations Tradima Fermentations

Use Tradima for small and large scale companies

More resistant to transport stress and mold formation

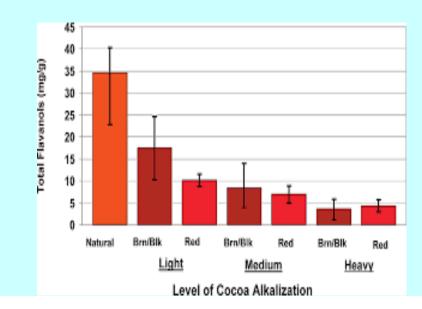




**Anima and Tradima Fermentations** 

## **Recommendations**

Large scale Anima and Tradima makes Dutching unnecessary, obtaining more savory and 400% more healthy industrial cocoa products







**Anima and Tradima Fermentations** 

### **Recommendations**

- Numerous research projects are needed to explain the *chemical and sensorial* bases of Anima and Tradima quality traits.
- These should include studies of beans during fermentation, after fermentation, after drying and after storage.
- So far, only one student in Cameroon is planning his PhD study (Patrick Fokem)





## **New Cocoa Path**





### The End of the Glacial Cocoa Era:

- Warm Cocoa Stimulated the Mayas
  - By Drinking its Hot Chocolates
  - Aromatic Cocoa Pulp and Beans
    - Were Savored by the
    - Matsigengas" in Cusco
  - Female Cocoa Beans Dominated
    - **The Male Coca Leaves**
  - Consumed together by the Incas
  - These are Warm, Savory and Love Traditions





### It was the Spanish that initiated the Path

- Of Chilling Down Cocoa
  - Mixing it with Milk
  - Mixing it with Sugar
- Destroying its Original Spirit
  - **They Produced Cocoa Beans**
- In "Dead" Boxes without Air
  - Suffocating Her
  - Killing Her Soul





With so much SufferingShe became



- Glacial, Bitter and Astringent
  - And lost Her Fine Flavors
    - Treated with Lack of
      - Understanding
      - For Five Centuries





- The Genocide of
- Cocoa Beans Continues
- Suffocating Her Massively
  - Inside and Outside
  - Concentration" Boxes



- And then Treated by the "Dutching" Process
  - **To Eliminate the Consequences of** 
    - Cocoa Sufferings
  - **To Eliminate most of Her Beauties** 
    - Including Antioxidants
- **Creating a Chemical "Frankenstein" Product** 
  - That Nothing has in Common
    - With Her True Nature
  - **Gracious, Docile, Savory, Aromatic** 
    - And Healthy







### Finally,

- Another Dutch Invention
- Respecting Her True Nature
  - Is now Illuminating the
- Light at the End of the Tunnel
  - Of Her Massacre







- She is Reviving
- Performing Her Path Back
- **From the Past to the Future** 
  - From the Traditions
  - Of the Matsigenkas,
    - Of the Incas and
      - Of the Mayas
  - That were the First
- **To Worship the Cocoa Goddess**





Docile, Savory and Aromatic A "SuperNatural" Being That Cures Many Diseases And Feeds the "Anima" Of the Human Being The Most Perfect Being in the World!



#### **Fermentation Technologies**

### **Discussion**

**Fermentation** 

**Technologies** 





### **Three Recently**

### **Invented Cocoa**



**By-Products** 

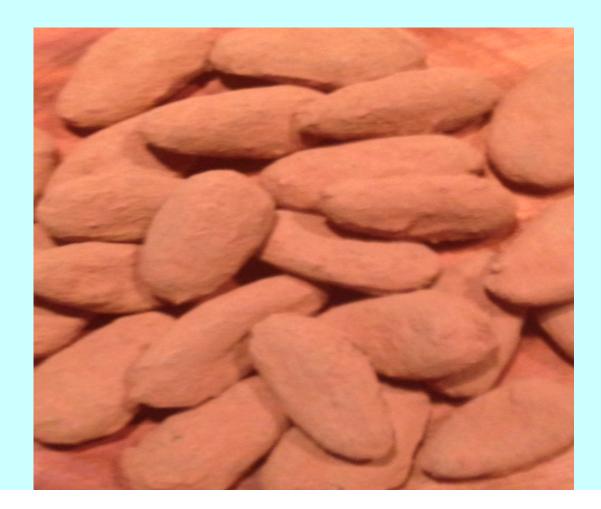
# CacaoNuts CacaoNutlates Cocoa Perfume



### Objective: More Farmers Income



### **1. CACAONUTS**







#### **By-Products**

### **CacaoNuts Factory**



- Two Hours Drying at 50-60 Degrees
- Add Cocoa Powder
- Shelf Life 2 Years in Frig and 6-12 Months at Room Temperature





#### **By-Products**

### **CacaoNut Features**

- ➢ 100% Cocoa
- > 0% Bitterness and Astringency
- Savory with Nutty and Fresh Pulp Taste
- Whole Fruit Product
- 100% + Polyphenols than B2B Chocolate
- 100% + Fibers than in Chocolate







2. CacaoNutlates = CacaoNuts as Chocolates

2.1. 100% CacaoNuts

2.2. 50% CacaoNuts 50% Chocolate





### **Phenomenal Cocoa**





### CacaoNuts (dry fruit) and CacaoNutlates (balanced chocolate profile)

Treat- ment	<b>Citric Acid</b>	Bittern.	Astring.	Сосоа	Nutty	Sweet	Fresh fruit	Mature Fruit	Floral	Prefe- rence
Cacao Nuts	4	1	0	2	6	3	8	3	6	9
Chocolate 70%	0	3	2	7	3	4	0	4	0	7
Cacao- Nutlates	3	2	0	4	4	4	7	4	5	10



### **CacaoNuts and CacaoNutlates**

- \* Special Unique Taste Comes from the Pulp (Fruity and Floral)
- \* Can be Marketed for Fine Chocolate and Health Consumers
- \* Potential New Commodity Segment!

### **Extra Income for Farmers!**



### **3.Cocoa Perfume**







### **Cocoa Perfume Factory**

GacaoNuts and CacaoNutlates

Special Unique Taste Comes from the Pulp (Fruity and Floral)

> Can be Marketed for Fine Chocolate and Health Consum

> Potential New Commodity Segment!

Extra Income for Farmers



Alcohol + Aroma



### **Cocoa Perfume**

- Collected from Emptied Husks
- With 95-100% Alcohol
- ► 300 Husks = 1 Liter Product
- Two Hours Man Labour
- **3 % Fixator**
- ► 6 Months Maturation

NB. One liter of true Rose Perfume Needs 1500 kg of Rose petals



### **Phenomenal Cocoa**





### **Persistance on the Skin**

Chanel 5: 12 hrs

**Cocoa** Rose "Perfume": 12 hrs !!!!

**Cocoa** Jasmine "Eau de Perfume": 6 hrs





### **Potential Market Value**

- \* Attractive Product for Consumers
- \* Craft Cocoa Perfume can be expected to sell in Perfume and Chocolate Shops





### **Potential Market Value for Farmers**

- \* 50 ml of Eau de Perfume: 20 USD
- \* One liter = 400 USD



\* **Two hrs of collecting = potentially** valued at least at **100 USD** 



### Conclusion

## New by-products have potentially great market value:

\* CacaoNuts \* CacaoNutlates \* Cocoa Perfume



Potentially increased sustainability for the farmer



#### **Caipirinha Fenomenal**

## Ultimo pero no la Peor Invención:

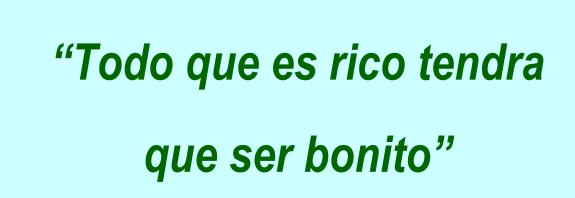






**Caipirinha Fenomenal** 

### Mescla de 2-4 Frutas em Vez Solo uma Fruta







Caipirinha Fenomenal Composición: 1/2/3 "Todo que es Bueno deberá ser Simples"



Uma Dosis: 2-4 Frutas Espremidas Dos Doses: Cachaça, Wodka o Agua Tres Doses: Hielo Triturado con la mana





### **Caipirinha Fenomenal**

### **Algunas Combinaciones**

- 1/2 Limón verde + 1/3 Guyaba +1/2 limón dulce
  - 1/2 Limón verde + 1/2 Limón dulce
- 1/3 Limón verde + 1/3 Limón dulce + 1/3 Maracuyá
- 1/3 Limón verde + 1/3 Mandarina + 1/3 Maracuyá
  - 1/3 Limón verde + 1/3 Tangerina Ponkan+
    - 1/3 Maracuyá
    - 1/2 Limón verde + 1/2 Mandarina
  - 1/3 de Limón verde + 1/3 de Anacardo + 1/3 de Maracuyá

Azúcar según preferencia



#### **Caipirinha Fenomenal**

### Cheers

Santé

### Prosit

Salud

Phenomenal Cocoa & Chocolate Delicacies

The Magie of Reality





### Remember

Presentation, Protocols and My Book are Freely Available at:

albertuseskes @ gmail.com



#### **Phenomenal Cocoa**

### THANKS

