

Charcoal Extruder

Fuel from Sugar Cane Waste

2.009 Blue Team

8 December 2004

Agenda

- ♦ Making charcoal
- ♦ Product design
- ♦ Charcoal cooks!
- ♦ Haiti implementation



Haiti: Deforestation & Poverty



- ◆ 98% deforested

- ◆ 65% in poverty



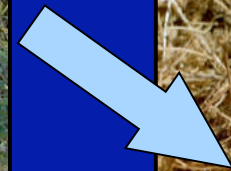
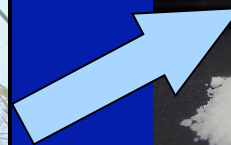
- ◆ 500 USD annual income

- ◆ 14% for wood charcoal

Alternative Fuel



sugar cane



Lead Customer

- ♦ Amy Smith
- ♦ Bagasse \Rightarrow charcoal
- ♦ Compaction device



Making Charcoal



harvest



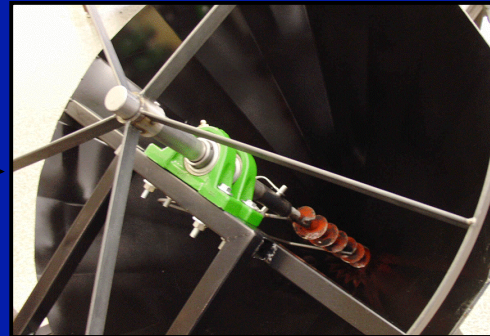
burn



carbonize



mix



compress



cook

Design Goals



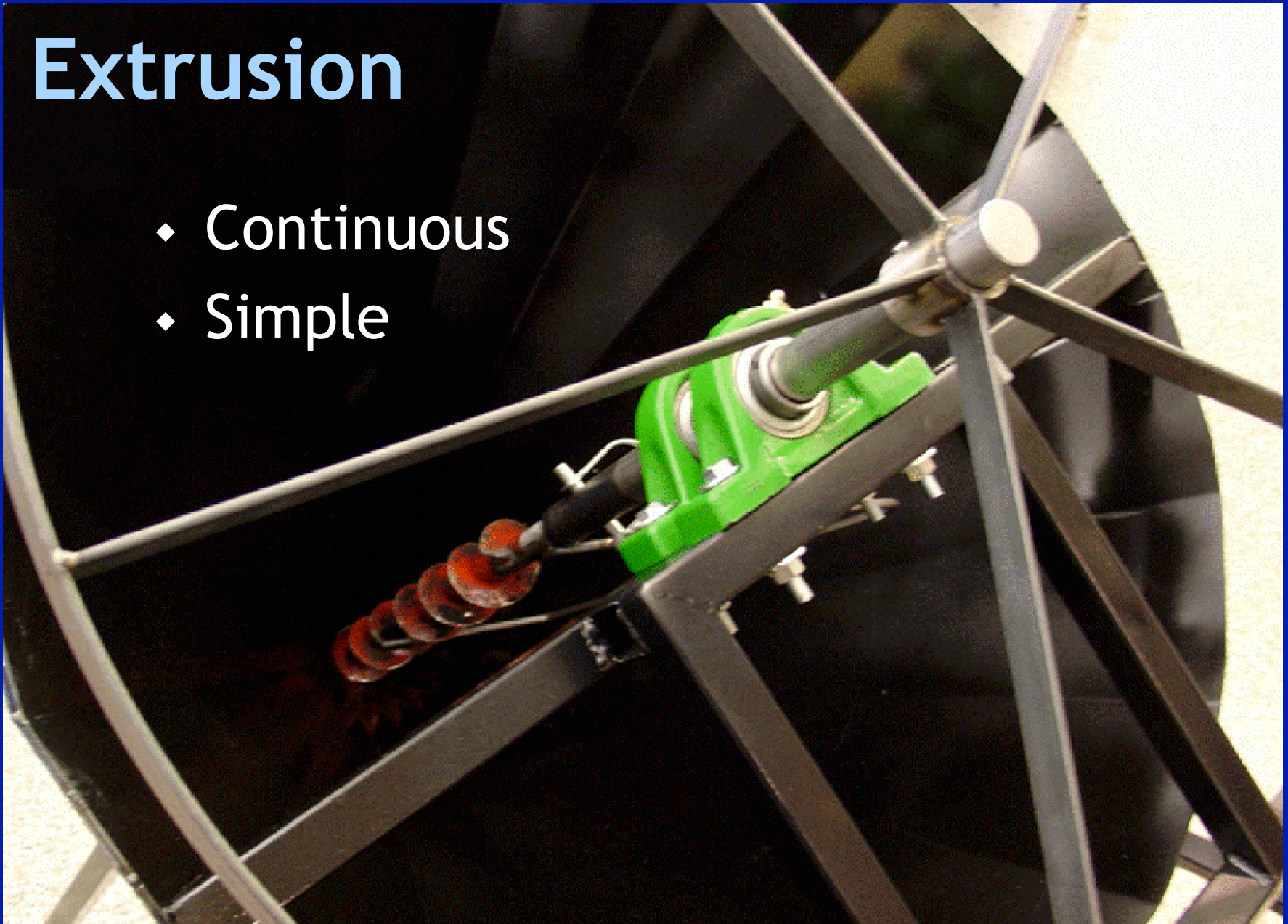
- ♦ Make useful fuel

- ♦ Rugged
- ♦ Made in Haiti
- ♦ Low cost



Extrusion

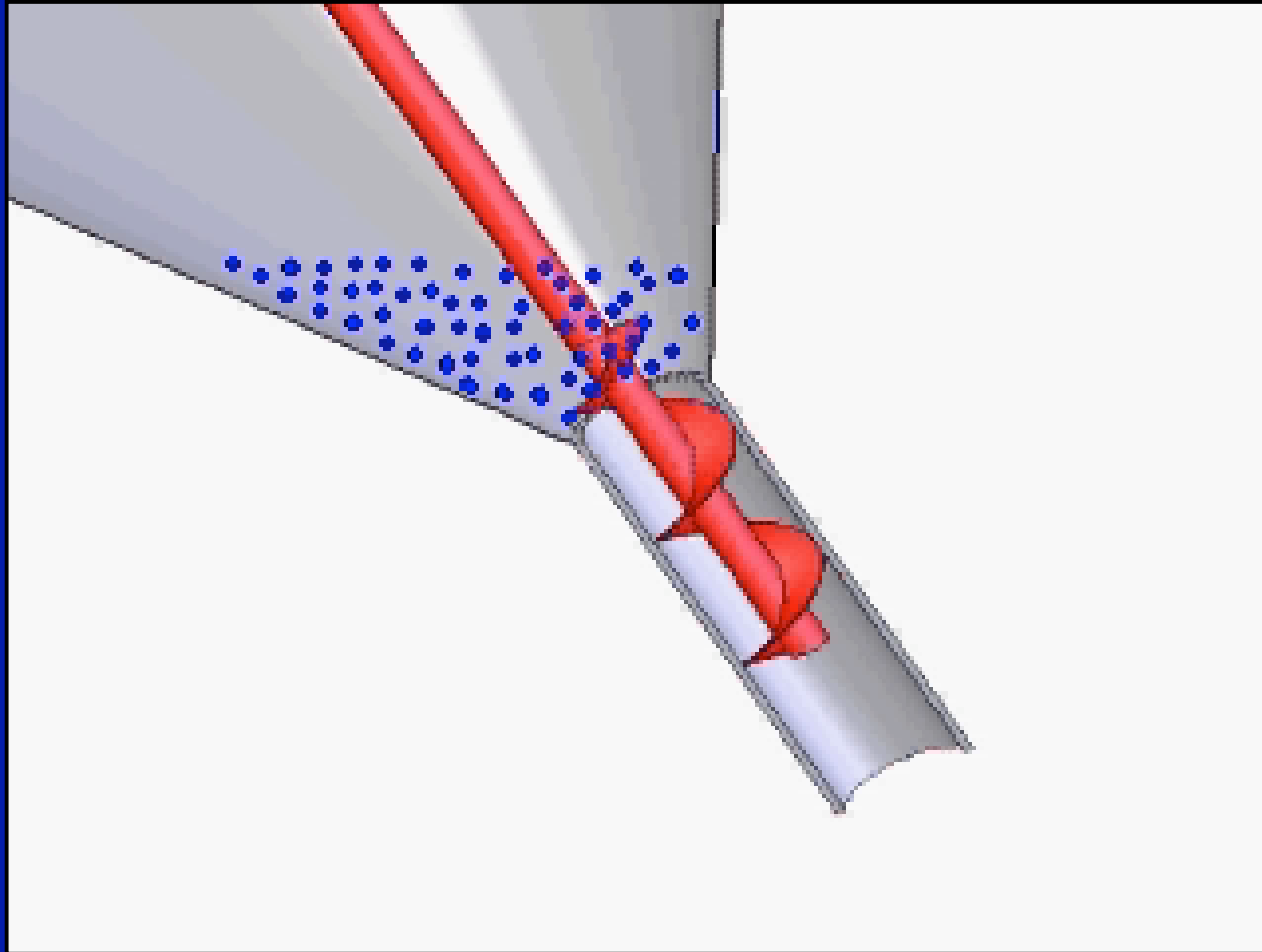
- ◆ Continuous
- ◆ Simple



Extrusion



Extrusion



Extruder Performance

- ♦ Operation
 - _ 2 min/meal
- ♦ Cost
 - _ 63 USD parts
 - _ 25 USD labor

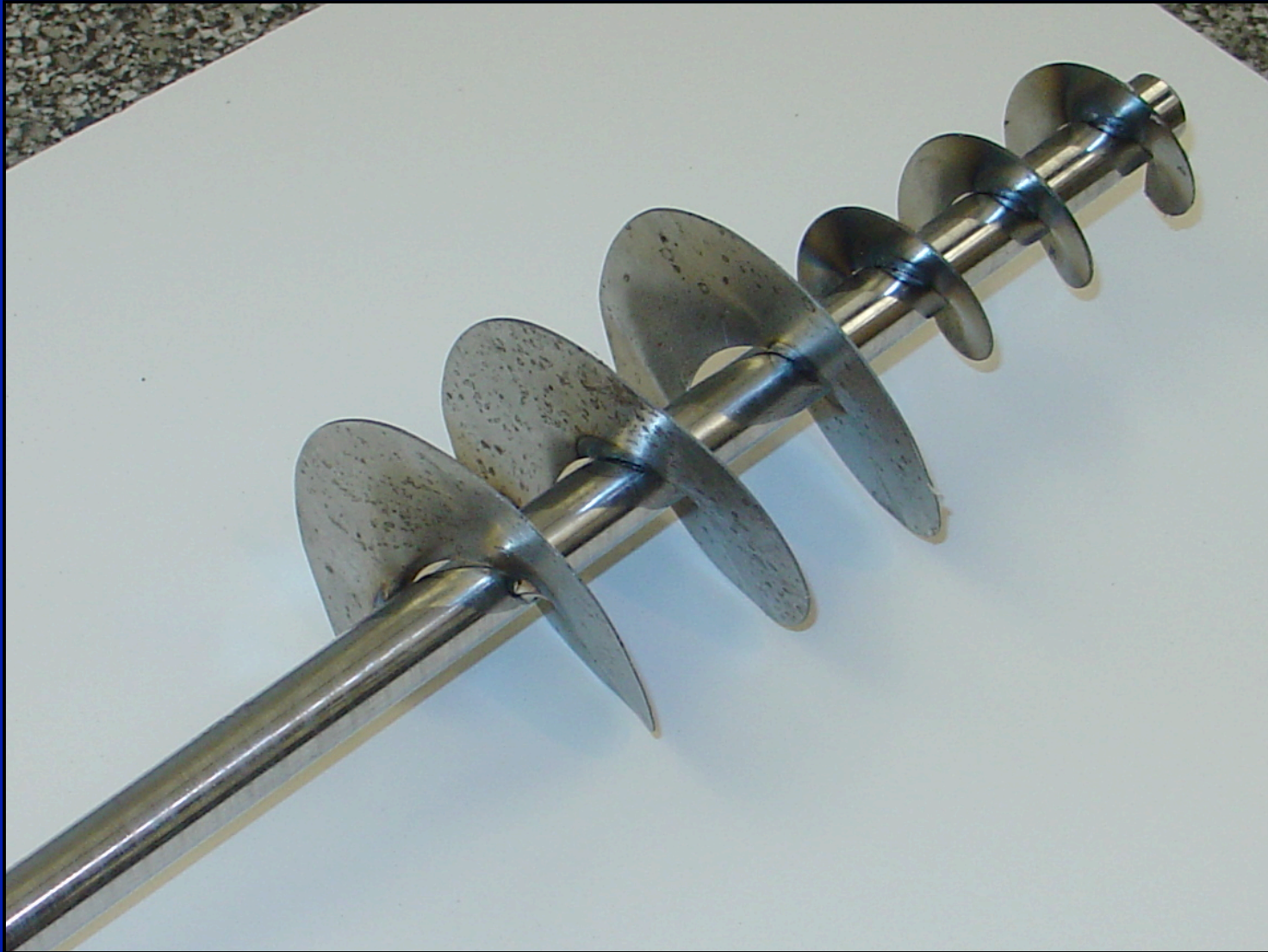


Made in Haiti

- ♦ Local materials
- ♦ Local metal-working skills

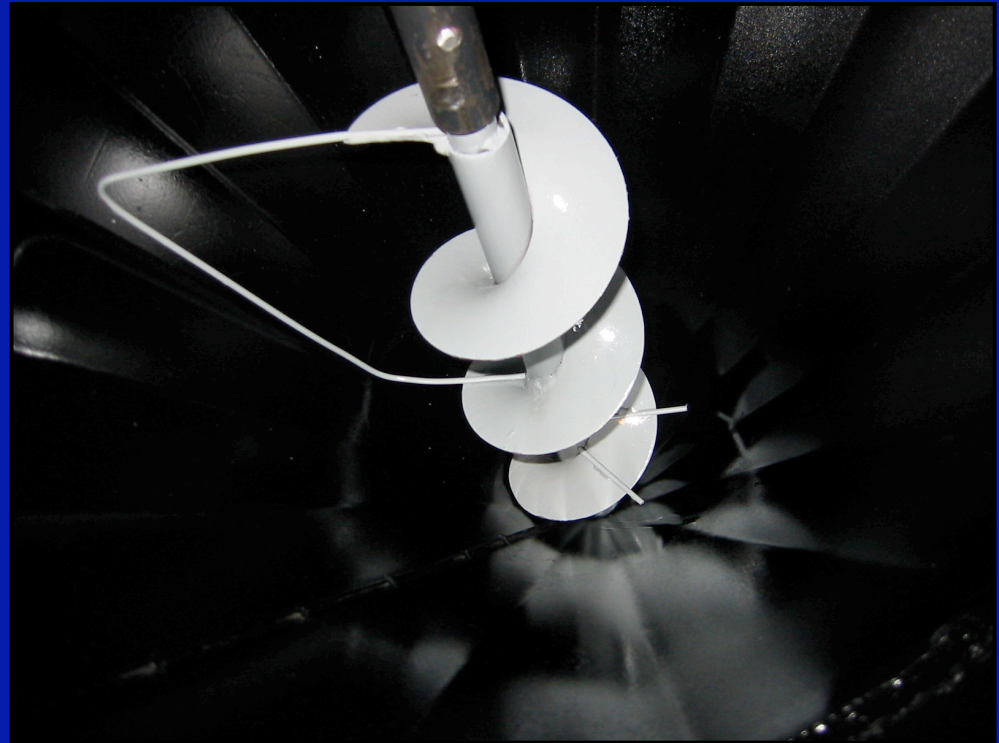


“Made in Haiti”

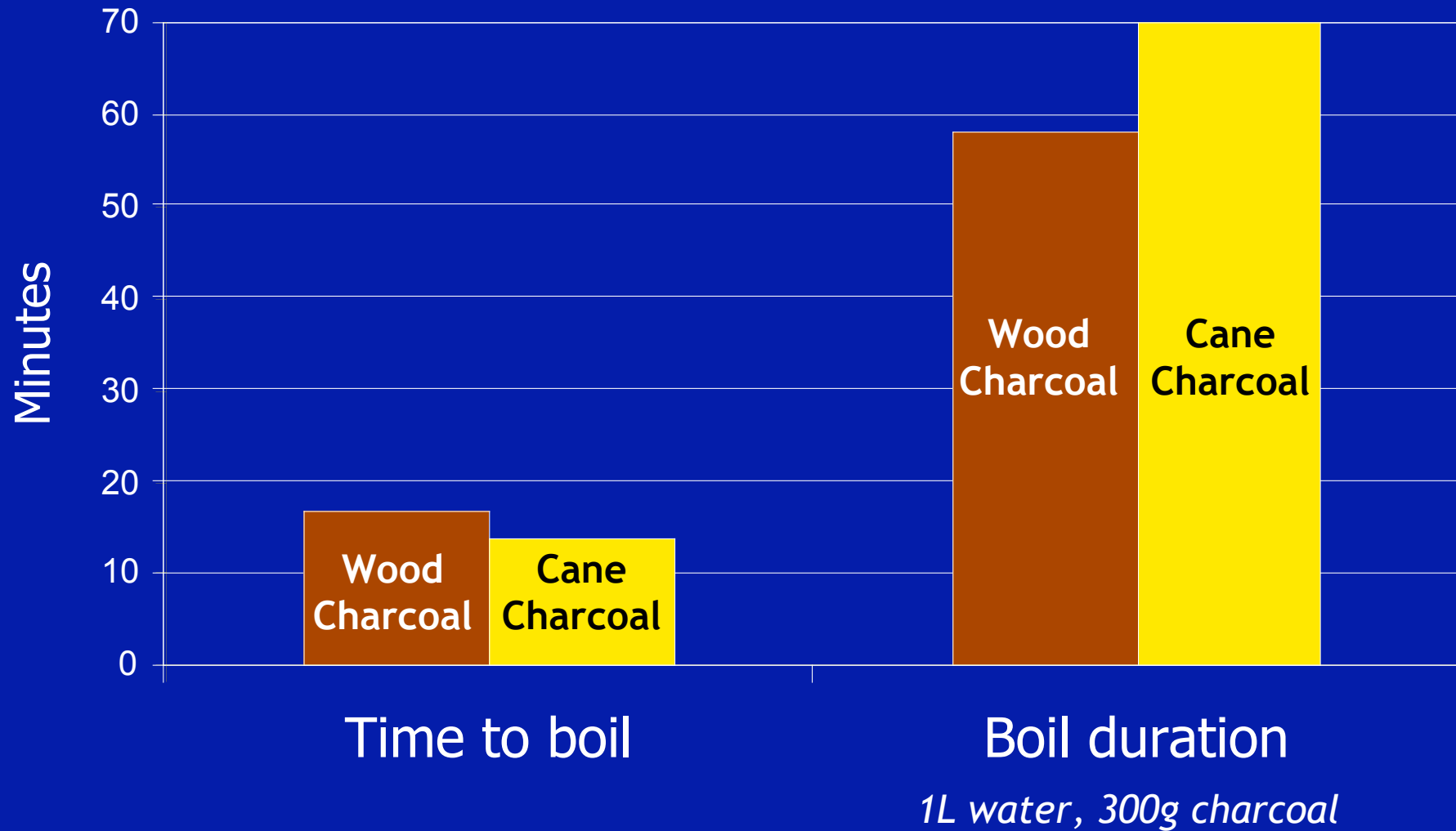


Feeding into Hopper

- ♦ Goals
 - _ Continuous
 - _ Efficient
- ♦ Variables
 - _ Angle of hopper
 - _ Screw threads exposed
 - _ Paddle to break up material



Does it Cook?



Going to Haiti

- ♦ Instruction manual
- ♦ Replicate by sight
- ♦ Small family communities
 - _ January: trial to collect feedback



Impact

- ♦ One community
 - _ Improve lives
- ♦ Spread slowly
 - _ Decrease deforestation

Acknowledgements

- ♦ Amy Smith Project Advisor
- ♦ Dave Wallace Course Instructor
- ♦ David Meeker, Woodie Flowers Section Instructors
- ♦ Melissa Barbagelata Mentor
- ♦ Dick, Bob, Bob, Steve, Joe Pappalardo Lab Staff
- ♦ Scott Spence Central Machine Shop
- ♦ Jamy Drouillard Haitian Life Consultant
- ♦ Sugar cane supply companies



Questions?

Alternate Slides

Acknowledgements

- ♦ Amy Smith
- ♦ Dave Wallace, David Meeker,
Woodie Flowers, Melissa Barbagelata
- ♦ Pappalardo Lab
 - _ Dick Fenner, Bob, Bob, Steve, Joe
- ♦ Central Machine Shop
 - _ Scott Spence
- ♦ Jamy Drouillard
- ♦ Sugar Cane supply companies

Carbonization

Solid Fuel Smoke



Primary killer of young children

References

- ♦ <http://www.globalvillage4humanity.org/6A1.HTML>
- ♦ <http://www.solarovens.org/sossport.html>
- ♦ Amy Smith
- ♦ (<http://news.bbc.co.uk/2/hi/americas/3979453.stm>)
- ♦ [http://hdr.undp.org/statistics/data/indic/indic_25_1_1.html]