

Cows, Culture and K washior kor

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About the Author: Born and raised in Eastern Washington, the Inland Northwest, Kalli is currently a senior pursuing a degree in Environmental Studies. She is looking forward to working with different organizations in pursuit of a healthier environment for all. Kalli has great interest in bettering the health of the community of Sanambele in a sustainable manner and because of this project a newfound interest in the ways in which animals benefit a community. Kalli is looking forward to a year or two of volunteering before going on to possibly pursue a graduate degree in world health.

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Abstract:

Through the Research course PSPP-465 we have found that one of the holistic goals of both the womens association and the elders is to create and sustain a healthy community. This refers specifically to their previous and current issues with malaria and kwashiorkor. Due to the work done in the last five years by PSPP465 students and faculty the village has been able to eradicate cerebral malaria, measured in zero deaths. However, in terms of kwashiorkor completely solving the problem without imposing on the culture of the village and providing the best possible source of protein has not been achieved. The risk of developing kwashiorkor for children in Sanambele is about 1 in 5 for those 36months and younger. If the Womens' Association of Sanambele were to use their profits from the handicrafts to purchase dairy cows for the village, then kwashiorkor could be eradicated from the village because with two cups of milk a day proteins can be built properly and the factors contributing to the development of kwashiorkor in the children of Sanambele would be eliminated. In this paper I have explained the solution that I believe will solve the problems with kwashiorkor without influencing the culture of Sanambele in a sustainable way if implemented in the correct manner. The importance of essential amino acids in forming complete proteins is explained and examined. Along with this information the solution researched for this paper will be examined, in-depth, and analyzed as to if purchasing dairy cows is the best way to resolve the issue of kwashiorkor present in Sanambele and if this is a plausible endeavor for the village. Two dairy cows would be necessary for the recommended amount of milk to be provided to the population of children not breast-feeding and are under the age of three, the high-risk population.

Introduction:

Proteins are an essential part of diet for any living being on this planet. Proteins are made up of essential and non-essential amino acids. These amino acids are the building blocks for many proteins like hormones, and enzymes found in the body. There are 13 amino acids total and 10 of them are essential, to develop kwashiorkor only one amino acid is missing. The consumption of proteins is a process, known as protein synthesis in the body; first the protein is broken down in the stomach by the enzyme pepsin into smaller peptide chains, second those chains move to the small intestine and are then separated into their respective amino acids and finally distributed throughout the body and combined into proteins also throughout the body (Otten, et al., 2006).

The last statistics recorded in Sanambele for kwashiorkor were obtained in 2008. At that time when height, weight, and age were compared for all the children 36 months and younger. Of those children 21% were found to be at risk for kwashiorkor and 2% had kwashiorkor. Now, 2 years later, that 2% is doing well and is completely out of the danger-zone thanks to a high protein regimen and the work of the women to alleviate this disease (Dunkel, 2010). The general diet for the children of Sanambele is high in carbohydrates, with the main protein source that provides essential amino acids not available in the grain based diet of Sanambeleans is grasshoppers, peanuts, chicken guts, and fish (Coulibaly, 2010). This diet is sufficient in providing a high caloric diet for children however, there appears to be no stable source of complete amino acids. Without a well-rounded diet, including those missing proteins, issues in constructing healthy and proper proteins arise; this decreases the permeability/absorption of nutrients and eventually develops into Kwashiorkor with an array of symptoms (Pelletier, 1993).

The definitions of kwashiorkor are that it is a disease involving severe malnutrition in children due to a lack of protein in the diet that usually occurs at the time of weaning from the mother. Symptoms of Kwashiorkor include; changes in skin pigment, coma (late stage), decreased muscle mass, diarrhea, failure to gain weight and grow, fatigue, hair changes (change in color or texture), increased and more severe infections due to damaged immune system, irritability, large belly that sticks out due to edema (protrudes), lethargy or apathy, loss of muscle mass, rash (dermatitis), shock (late stage), swelling (edema) (Pelletier, 1993). Although most of the symptoms of Kwashiorkor are reversible with treatment there is the possibility of permanent mental retardation (Pelletier, 1993). If the Womens' Association of Sanambebe were to use their profits from the handicrafts to purchase dairy cows for the village, then kwashiorkor could be eradicated from the village because with two cups of milk a day proteins can be built properly and the factors contributing to the development of kwashiorkor in the children of Sanambebe would be eliminated.

Methods and materials:

In my research of this topic there were many sources to use. Through taking the research course it was expressed that the most important part in helping those who in need is to do so in a manner that addresses their holistic goals (Savory and Butterfield, 1999) without imposing your personal culture on them and respecting the culture they have established. Another aspect of the course that contributed to my research was the intercultural development index and our reading of Bennett's Becoming Interculturally Competent we were able to identify our position on the scale and work towards improving to the next stage. Through working with Sanambebe we were able to find that

our understanding of their culture improved as our research got more in-depth. While Sanambele lacks material wealth it is rich in culture, family and the sense of belonging ingrained in each person who lives there. The book *Three Cups of Tea* (Mortenson, 2006) expresses the importance of having the people from that culture in charge of their own health care, and that the decisions made are entirely those of the people. Keeping this in mind when performing the role-play, a key part of the research course, the idea was brought up, “what if the village were to use cows to solve the problem? Is it culturally acceptable for the use of cows in Sanambele?” This sparked my research and changed my experience in the course. The importance of understanding the culture of Sanambele was key to the research accomplished and allowed for a greater understanding of foreign cultures overall.

I was able to pose personal questions to Dr. Florence Dunkel and Keriba Coulibaly, both well versed in the culture of Sanambele, how the village functions, and what everyday life is like for any social class, some times referred to as castes, in the society of Sanambele. This allowed me to do a complete study of the issues facing Sanambele in terms of Kwashiorkor. I also used peer-referred articles through databases like Medline, and ERIC. I was able use the research of others to familiarize myself with not only kwashiorkor but cows, milk productions, and the importance of complete protein sources and how they contributed to the overall health of children, especially at the weaning stage. In my research I was able to find milk production of cows, studies based on dairy versus grain in preventing kwashiorkor, and even the cost of purchasing a dairy cow in Mali.

Table 1, databases used, keywords and quantity of data found

Database	Keywords	Results found
Eric	Milk, kwashiorkor	0
Eric	Kwashiorkor	5
Medline	Milk, kwashiorkor	127
Medline	Milk, protein, kwashiorkor	70
Medline	Milk, kwashiorkor, village	0
Eric	Malnutrition, milk	6
Eric	Milk, cows	7
Environment Complete	Cows, milk, production	2227
Environment complete	Cows, grazing, land use	32

Results:

The women of the village are currently using protein/ vegetable mash given to children in the weaning period as a preventative action (Coulibaly, 2010). This includes; cereals flour (millet or soghum or corn) mixed with cowpea flour and or peanuts and tomatoes (Coulibaly, 2010). The women/village also has a diet regiment in place to reverse kwashiorkor if and when it arises in their children. These diets are distinctive and differ in content and purpose, one is used as a form of prevention and the other as a cure. It was also found that cows milk is already present in Sanambebe and an accepted part of the culture (Coulibaly, 2010). Many studies have been done to look at grains or eggs as a solution but through those studies it has been found that milk makes the most improvement.

Milk is a good solution as the preventative source of complete protein because there are no cultural issues with the consumption of milk, and in some of the families milk is already being consumed. It simply depends on if the family can afford to purchase milk or not (Coulibaly, 2010). Also milk is a source of complete protein that is essential in the diet of children weaning from the mothers breast milk. It was also found as will be

seen in table 3; cows milk provides the essential amino acid missing from the diets in Sanambelean children. Cows milk was found to have .046g of tryptophan per 100g of milk. The table that follows is one that should be considered while remembering that these are only estimations. This table shows the “recommended daily protein requirements” and found that the older the child the less overall amino acid intake is required for proper structure and building of proteins. The age group shown in the table that is the “at-risk” group is the 1-3 year range.

Table 2-dietary reference intakes for total protein (Ottenm, et. Al., 2006).

Recommended daily protein requirements		
Units: g/kg body weight/day		
Age Group	Males	Females
7-12 months	1.2	1.2
1-3 years	1.05	1.05
4-8 years	0.95	0.95
9-13 years	0.95	0.95
14-18 years	0.85	0.85

In the comparative study of milk to maize (Brewster, et al 1997) it was found that the immediate results come from maize, something like the cowpea mash used in Sanambele, however it was determined in that study that while maize gives immediate results the long-term results of using milk as a protein source made greater improvements in the health of those affected and there was no sign of kwashiorkor in those children after a short time. This study concluded that milk is a superior solution to kwashiorkor in

terms of mortality, weight gain, clinical sepsis (organ disfunction), and improvement in intestinal permeability, the ability for the children to absorb the nutrients they are ingesting in their everyday diet. (Brewester, et al, 1997) Milk may cause an increase in diarrhea at first due to minor lactose intolerance, but after the patient's body adjusts to the lactose overall improvements are greater, it reverses the effects of the disease altogether.

Of course, mother's milk is the most nutritional for children when compared to other sources of milk. However, by consuming only 2 cups of milk a day (Taylor, 2010) the contributing factors would be eliminated, there by eliminating the threat of kwashiorkor. There are other residual benefits from consuming this milk; potassium, calcium, ECT. Children who consume 2 cups of milk a day will be more active, alert, and their immune systems will be more capable of taking on viruses and other possible health issues (Cederberg and Mattsson, 1999).

As of right now there is no shortage of farmland available surrounding the village, however farm management is becoming an issue and it will be important to have exact boundaries to the land used for cattle (Coulibaly, 2010). Dairy cows are said to produce about 8 gallons of milk a day. That is roughly enough milk to provide 2 cups of milk a day for 64 children, with only one dairy cow. With the estimates of the number of children at risk for Kwashiorkor from 2008, 2 dairy cows would provide the milk needed to eliminate kwashiorkor (Cederberg and Mattsson, 1999).

Table 3- Amino Acid Content of cow's milk (Fachamps, et al, 1998)

Amino Acid	g/100 g Cow's milk
Tryptophan	0.046
Threonine	0.149

Isoleucine	0.199
Leucine	0.322
Lysine	0.261
Methionine	0.083
Phenylalanine	0.159
Tyrosine	0.159
Valine	0.220
Arginine	0.119

Discussion:

It is important that the village fully understands what it will take to care for the dairy cows, how they differ from the cows already present in the village, and if it is possible to use the cows already there rather than purchasing new cows. The exact number of cows needed cannot be determined without more information including, the amount of land, if any, available for grazing, the approximate number of children under the age of three currently and previous population trends with that age group. Without this information it is impossible to determine how many cows are needed because the village should only get the number of that cows would be sustainable in the village. Without this information it is my recommendation that to start two dairy cows should be purchased. As a “test” period by doing this it will allow the village to fully understand the responsibility and see the actual effect of milk in the diet of at-risk children.

The question of who would care for the cows is one that needs answering. The children have the responsibility of caring for the village goats and chickens and with the

proper training the children will be more than capable of caring for the village cattle. Milking, and feeding will be the main concerns along with the need for a “village veterinarian”. Also, how would owning dairy cows benefit the village in ways other than prevention of kwashiorkor? The cattle will provide a great fertilizer for the crops of the village; the use of cow’s milk could eventually turn into a profitable endeavor by way of starting a village dairy. That would provide capital for the village and help in addressing further issues facing the village.

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The Women’s Association is currently paying back a micro-loan they used to build a handi-craft workshop and storage building in Sanambebe. Keeping this in mind this solution to kwashiorkor should not be implemented or tested until that loan is paid off and the Association is again in the black (Yunus, 2007). It wouldn’t be economically responsible for the Association to take out another loan or put off paying back their other loan to purchase cows when there is currently a plan in place to work with kwashiorkor. Further research is necessary to determine if the cows in Sanambebe can be utilized for their milk before the purchase of any cow occurs.

Conclusion:

If the Womens Association were to use their profits to purchase one to two dairy cows for the village of Sanambele then kwashiorkor could be eradicated from the village because 2 cups of milk a day provides a good source of complete protein which would prevent the development of kwashiorkor. I found this hypothesis to be true for, however it is not realistic for the village of Sanambele at this point, especially when they have other more plausible resources.

The conclusion I have come to, that through the utilization of cows milk, either through the purchase of dairy cows or use of cows already present in Sanambele, kwashiorkor can be eradicated if 2 cups of milk a day are distributed to all children ages 0-3 and no longer breastfeeding. Through the research completed in this course, I was able to determine that milk is a great source of complete protein and has the capabilities of preventing kwashiorkor from developing. Also because cows milk is culturally acceptable and easily accessed it would appear to be the most reasonable choice for the village. Milk provided by the cow contains that missing essential amino acid specifically in the diet of the Sanambelean children; now that we know this where do we go from here?

Recommendations:

When doing research on a culture foreign to your own it is important to make recommendations in a way that is not imposing on those it is concerning. The list that follows is one that is the course of action I would recommend for the village of

Sanambele if these findings were to be found relevant and accepted by the womens association and village hierarchy.

1. Converse with the women and elders about cows and if they are the best option, presenting this research with others work giving the complete process that would take place, cost analysis and possible profitability along with eradicating kwashiorkor.
2. Further research is needed to determine if the cows already present in Sanambele are capable of providing the milk needed or if it is necessary for the village to purchase dairy cows.
3. Determine the land available for the dairy cow/cows and set up a schedule for which land will be grazed when and how to distribute the potential fertilizer.
4. Apply for a micro-loan if profits from handi-crafts would not cover the purchase of the cow roughly 5000Rs to 10000Rs depending on the market and if the village determines 1 or 2 dairy cows is needed.
5. Establish housing for the cows during wet-season and determine what other feed would be needed for the cattle.
6. Research who is responsible for caring for the cattle already present in Sanambele and determine if they are the best option for caring for the possible new additions
7. Use participatory activity methods (outlined on page 18) with the schoolteachers in the village to find the best way to educate children about kwashiorkor and why milk/protein is important. This will change the way in which villagers see the disease and they will have a greater understanding

because it is the responsibility of the children to care for the younger siblings, those at risk for kwashiorkor.

8. Distribute 2 cups of milk a day to each child under 3 years old and not breast-feeding after three years.
9. Test children affected by kwashiorkor for symptoms of kwashiorkor before consumption of milk, after one week, one month, three months, and six months by bringing a scale to the school and recording the weight of the children to determine if they are still showing symptoms of kwashiorkor.

It is important to keep in mind that any plan or course of action can be varied or changed depending on the issues that arise in the future.

Acknowledgements:

I would like to thank Florence Dunkel and Keriba Coulibaly for their participation in my project and research. Dr. Dunkel and Keriba Coulibaly are the two people responsible for imparting their knowledge of the culture and inter-workings of the village of Sanambele. They have worked tirelessly for more than five years toward accomplishing the holistic goals of the village. My deepest appreciation goes out to both of these individuals.

I would like to thank the participants in this research course without the diverse input of the other participants the overall lessons of the course would not have been as meaningful. And to the people of Sanambele I would like to show my appreciation for their acceptance and participation in the research projects of students like myself. It is my hope that this research will help them to accomplish their goals in some way.

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•**Yunus, M.** (with Karl Weber) 2007. *Creating a World Without Poverty: Social Business and the Future of Capitalism*. Public Affairs. New York NY. 261 pp. (Chapter 3, Chapter 11 and Epilogue).

Participatory Exercise:

I propose the use of the game Jenga or something similar, with separate blocks making up rows and the rows build a tower, to describe the difference between an amino acid and a protein as well as the process involved in the development of kwashiorkor. For this to be accomplished a member of the MSU research team will need to bring the game pieces with them into the village. Before presenting whoever is leading the exercise will need to make sure there is a level surface for the game to be placed on.

Instructions to the leader:

- 1) Start out with three blocks in your hand, show a single block and explain that it represents a single amino acid.
- 2) Then explain that the three blocks, or one row, represents a properly built protein.
- 3) Next, the correlation to kwashiorkor, begin to remove blocks from the tower, explaining that when a single essential amino acid is missing it puts the structure at risk.
- 4) Finally, knock the tower over, stating that when the amino acid is missing your body continues to build improper proteins and unless those amino acids are put into the structure it can lead to death, or in this case the destruction of the tower.

QuickTime™ and a
decompressor
are needed to see this picture.

(handi-craft sale in Mali)

QuickTime™ and a
decompressor
are needed to see this picture.

QuickTime™ and a
H.264 decoder
are needed to see this picture.

(cows already present in Sanambele)

QuickTime™ and a
H.264 decoder
are needed to see this picture.