Classification of A1 milk and A2 milk by observational and scientific methods

Sheshagiri Jois[1], Bindu Shree C[2], Chethan A R[3], Kiran Naik C P[4], Sachin S[5]

[1]Assistant Professor, Dept. of Electronics and Communication Engineering, Maharaja Institute of technology-Mysore, Karnataka, India

[2,3,4,5]U.G. Student, Dept. of Electronics and Communication Engineering, Maharaja Institute of technology-Mysore, Karnataka, India

---***---

Abstract - *Milk from dairy cows has been regarded as nature's perfect food, providing an important source of nutrients including high quality proteins, carbohydrates and selected micronutrients. Recently, a relationship between disease risk and consumption of a specific bovine β casein fraction with either A1 or A2 genetic variants has been identified. It is a matter of great concern for the public health and hence there is a need to crosscheck our breeding policies, so that the purity of desi breeds and their beneficial qualities can be conserved. This is performed by using combined electronic sensory instrumental system such as color sensor, fat measuring assembly, pH sensor and air quality sensor. Complex data sets from the color sensor, fat measuring assembly, pH sensor and air quality sensor are combined with multivariate statics represents rapid and efficient tools for classification, discrimination, identification of type of milk and ensure the quality of milk. This project is implemented using ATMEGA328P microcontroller. All the sensors are combined to form compact and flexible system which analyze and classify the type of milk into different grades and finally output displayed on LCD screen. Problem faced by the individuals can be prevented by detecting the type of milk, and also prevent from causing the hazardous diseases by detecting the A1 type of milk.*

Key Words: **Arduino Uno Microcontroller, Color Sensor, pH Sensor, Fat measuring assembly, Air quality Sensor .**

1. INTRODUCTION

Milk is the highly evolved secretion of mammary glands of mammals and the most perfect food for infants. India is the world's largest milk producer and consumer, yet it neither exports nor imports milk. In the recent past, there is a growing public health concern, especially regarding the food we take. Milk from dairy cows has been regarded as nature's perfect food, providing an important source of nutrients including high quality proteins, carbohydrates and selected micronutrients. Milk contains about 85% water. The remaining 15% is the milk sugar lactose, protein, fat and minerals. Beta-casein is about 30% of the total protein content in milk. A2 milk is the milk that contains only the A2 type of beta-casein protein whereas A1 milk contains only A1 beta casein or A1A2 type variant.

Among the caseins, beta casein is the second most abundant protein and has excellent nutritional balance of amino acids. Different mutations in bovine beta casein gene have led to 12 genetic variants and out of these A1 and A2 are the most common. The A1 and A2 variants of beta casein differ at amino acid position 67 with histidine (CAT) in A1 and proline (CCT) in A2 milk as a result of single nucleotide difference. Currently, A2 milk is being marketed as a healthier choice than regular milk. It is claimed to have several health benefits, and is easier to be digested for people who are lactose intolerant.

1.1 A1 and A2 Milk

Milk from breeds of cows that originated in northern Europe is generally high in A1 beta-casein. A1 milk comes from breeds like the Holstein, Friesian, Ayrshire and British Shorthorn. Milk that is high in A2 beta-casein is mainly found in breeds that originated in the Channel Islands and Southern France. This includes breeds like the Guernsey, Jersey, Charolais and Limousin. Regular milk contains both A1 and A2 beta-casein, but A2 milk contains only A2 beta-casein. Betacasomorphin7 (BCM7) is the reason why regular milk is believed to be less healthy than A2 milk. BCM7 is an opioid peptide that is released during the digestion of A1 beta-casein.

1.2 Impact of A1 and A2 milk on human health

Recently, a relationship between disease risk and consumption of a specific bovine β-casein fraction with either A1 or A2 genetic variants has been identified. BCM7 is suggested to be associated as a risk factor for human health hazards as it can potentially affect numerous opioid receptors in the nervous, endocrine and immune system. It is also known to be an oxidant of low dietary lipoproteins (LDL) and oxidation of LDL is believed to be important in formation of arterial plaque. Epidemiological evidences claim that consumption of beta-casein.

2. LIST OF ABBREVIATIONS

CAT	DNA codone for Histidine
CCT	DNA codone for Proline
BCM	Beta-casomorphin
LDL	Low density lipoprotein
IDE	Integrated development environment
LCD	Liquid crystal display

Table.1 List of abbreviations

3. BLOCK DIAGRAM

The system mainly includes Sensors like Color Sensor, Air quality Sensor, Ultrasonic Sensor, Fat Measuring Assembly, pH sensor and Temperature Sensor are interfaced to Arduino Uno Microcontroller to differentiate A1 and A2 Milk and the output of this is displayed on LCD screen.
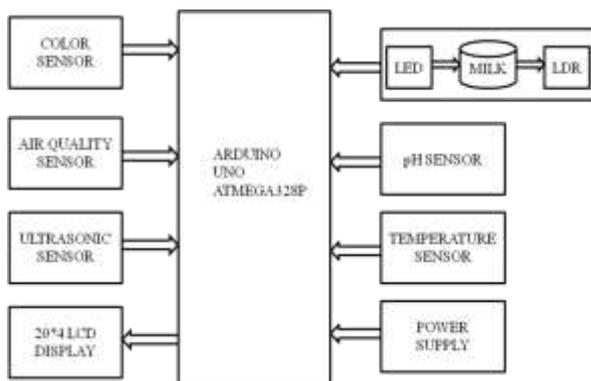

Figure.1 Block Diagram

In this project work Arduino IDE Software is used to programming. Executable will be downloaded to A1-A2 classifier hardware. After detecting the type of milk, the program will send corresponding details to serial port and the microcontroller will read the command and the output will be displayed on the LCD screen.

4. RESULTS

Color sensor values						Ph values		Fat content		Air quality sensor values	
A1 milk			A2 milk			A1 milk	A2 milk	A1 milk	A2 milk	A1 milk	A2 milk
R	G	B	R	G	B						
40	43	14	36	40	14	6.68	6.79	66	78	181	213

Table.2 Results

5. ADVANTAGES

➢ In smaller industries available space will be limited, so this digital device for the estimation of difference between A1 and A2 milk can be used.

➢ It is useful for common people to differentiate between A1 and A2 milk which helps to create a awareness to a common person to make use of A2 milk.

➢ Ease to handle

➢ Low initial investment and maintenance cost.

➢ Since price is minimum it can be easily produced to be used by any small diaries in rural areas.

➢ Output will be obtained within less response time.

➢ The power supply unit consumes less power.

6. CONCLUSIONS

The milk parameters such as fat, color and thickness are measured by our system and are consistent with standard values and PH and odor have given clear difference between A1 and A2. Mentioned parameters can successfully differentiate between A1 and A2.

REFERENCES

1. A2 Corporation 2006. 2006 Annual Report. www.a2corporation.com.

2. Elliott, R.B., Harris, D.P., Hill, J.P., Bibby, N.J. and Wasmuth, H.E. (1999) Type 1 (insulin-dependent) diabetes mellitus and cow milk: Casein variant consumption. Diabetologia. 42, 292–296.

3. Farrell, H. M. Jr., menez-Flores, R., Bleck, G.T., Brown, E.M., Butler, J.E. and Creamer, L.K. (2004) Nomenclature of the proteins of cows' milk-sixth revision. J Dairy Sci 87, 1641–1674.

4. Khate, K., Kataria, R.S. and Joshi. B.K. (2012) Screening of taurine and crossbred breeding bulls for A1/A2 variants of β-casein gene. Indian Journal of Animal Sciences 82 (2), 183–186.

5. Mishra, B.P., Mukesh, M., Prakash, B., Sodhi, M., Kapila, R., kishore, A., Kataria, R.S., Joshi, B. K., Rasool, T.J. and Bujarbaruah, K.M. (2009) Status of milk protein, β- casein variants among Indian milch animals. Indian Journal of Animal Sciences 79 (7), 722–725.

6. National Institute of Child Health & Human Development. (2004) Health research fact sheet for health professionals. http://www.nichd.nih.gov/ milk/healthresearch/fact sheet. cfms.

7. Woodford, K. B. (2006) A critique of Truswell's A2 milk review. European Journal of Clinical Nutrition 60(3), 437-439.

8. Woodford, K. B. (2011) Milk Proteins and Human Health: A1 versus A2 Beta-casein. An Address to the General Practitioners Conference,Sydney, 22 May 2011.