ASSESSING THE FATTY ACID PROFILE AND DIETARY FIBER CONTENT OF OAT BRAN AND OATRIM-ENHANCED BEEF PATTIES

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ABSTRACT

Red meat consumption has declined because of the relationship of saturated fat and cholesterol to increased risks for heart diseases. Use of oatrim and oat-bran (hypocholesteremic agents) in red meat products may improve product quality and lower cholesterol in the products. This study assessed the fatty acid profile and dietary fiber content of oatrim and oat bran- enhanced beef patties. Beef patties were formulated with oat bran (0, 3, 5%), and oatrim (0, 3, 5%) and grilled to an internal temperature of 80oC. Patties were evaluated for cholesterol, dietary fiber, saturated, monounsaturated, and polyunsaturated fatty acids content using AOAC (16th edition) procedures. Total fat in oat bran (7.04-6.9g/100g) and oatrim-enhanced (5.16-5.28g/100g) beef patties was lower (P<.05) than in control (8.24g/100g). Saturated fat was higher (P<.05) in control (4.26 g/100g) than in oat bran (2.84-2.92g/100g) and oatrim (2.38-2.48g/100g) patties. Polyunsaturated fatty acids were higher (P<.05) in oat bran (0.34-0.51g/100g) than in oatrim (0.19-0.21g/100g) patties. Monounsaturated fatty acids were significantly higher in oat bran (3.64-3.79 g/100g) and 5% oatrim (3.07) than in control and 3% oatrim patties. Addition of oatrim and oat bran increased (P<.05) dietary fiber in patties. Cholesterol values were lower (P<.05) in oat bran (65-67 mg/100g) and oatrim-enhanced (62-65 mg/100g) patties than the control (84mg/100g). The data suggest that oat bran and oatrim reduced total fat and cholesterol in beef patties and may have useful implications for heart patients.

OBJECTIVES

The objectives of this experiment were to formulate beef patties with oat-trim and oat bran and to evaluate the total calories, cholesterol, total fat and fatty acid (saturated, monounsaturated, polyunsaturated) content of these patties.

INTRODUCTION

Beef is a high protein food and is a major component of the diet in America and developing countries. However, it contains a high concentration of saturated fat and cholesterol, precursors to obesity, cancer and heart disease. The American Heart Association advises that the intake of food with high saturated fatty acids and cholesterol content should be limited. The Dietary Guidelines of 2005 stipulates that consumers should choose low-fat, lean or fat-free options when preparing meats. Saturated fats content should not be higher than 10 % of total caloric intake. Likewise, total fat should not exceed 35% of total daily caloric intakes. Consumers are therefore demanding meat products with reduced fat and cholesterol, and are willing to try any fat replacers in food products, provided the fat substitutes are safe. Oatrim and oat-bran's effectiveness as binders, fat replacers and in lowering cholesterol are well documented. Oatrim provides I calorie compared to fat which provides 9 calories. Oat bran and oatrim are high in the soluble fiber beta-glucan, which has been proven to have hypocholesteremic properties. The American Heart Association Eating Plan suggests that fiber-rich foods should be a part of the diet. The consumption of dietary fibers causes reductions in blood cholesterol levels, blood glucose and insulin response. Dietary fibers also contribute little calories, offer satiety, and positively contribute to the texture of formulated meats. Increasing dietary fiber has been recommended as a safe and practical approach for cholesterol reduction. Beef is low in mono and polyunsaturated fatty acids and contains no dietary fiber. Beef meat products may be formulated with oat products to offer appreciable amount of mono and polyunsaturated fatty acids and dietary fiber in the diet. In addition, oat bran and oatrim may lower cholesterol and saturated fats in beef products thus providing healthier alternatives to their high- fat counterparts offered in the supermarkets and restaurants.

METHODOLOGY

Beef patties were formulated with oat-bran (0, 3, 5%), and oatrim (0, 3, 5%). Patties weighing approximately 28 grams were grilled to an internal temperature of 80oC and evaluated for cholesterol, dietary fiber, saturated, monounsaturated, and polyunsaturated fatty acids content using AOAC (16th edition) procedures.

RESULTS

Fig. 1- Fat Profile and Dietary Fiber Levels in raw oat bran and oatrim

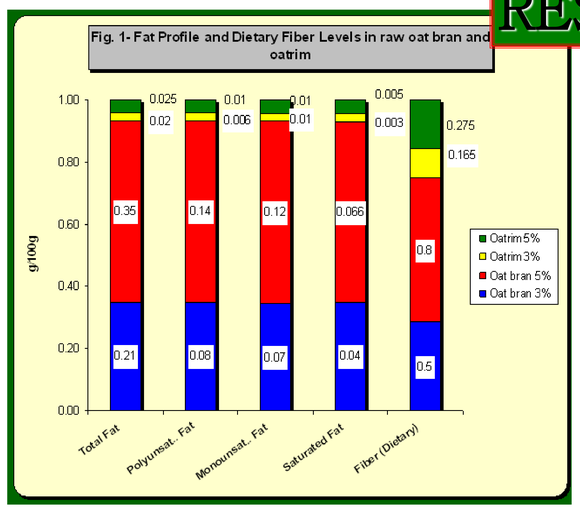
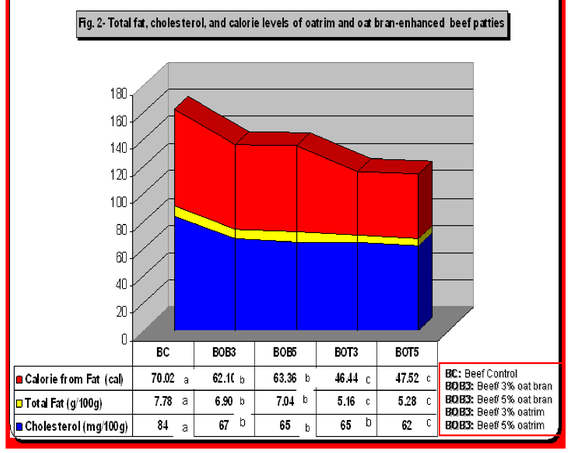


Fig. 2- Total fat, cholesterol, and calorie levels of oatrim and oat bran-enhanced beef patties



	BC	BOB3	BOB5	BOT3	BOT5
Calorie from Fat (cal)	70.02 a	62.10 b	63.36 b	46.44 c	47.52 c
Total Fat (g/100g)	7.78 a	6.90 b	7.04 b	5.16 c	5.28 c
Cholesterol (mg/100g)	84 a	67 b	65 b	65 b	62 c

BC: Beef Control
BOB3: Beef/ 3% oat bran
BOB3: Beef/ 5% oat bran
BOB3: Beef/ 3% oatrim
BOB3: Beef/ 5% oatrim

Fig. 3 -Fatty acid profile of oatrim and oat bran beef patties

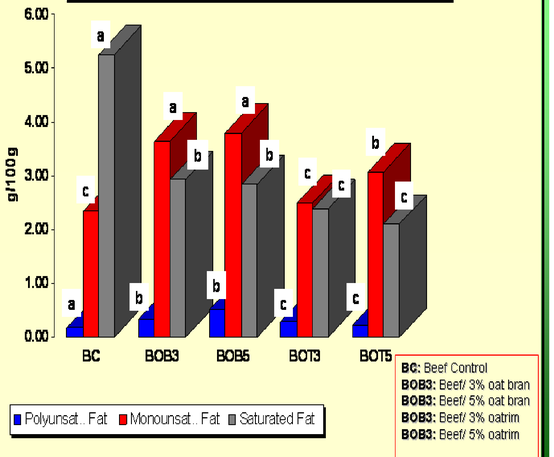
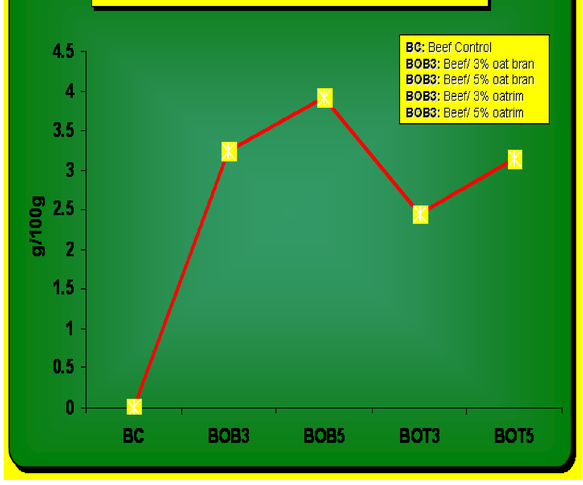


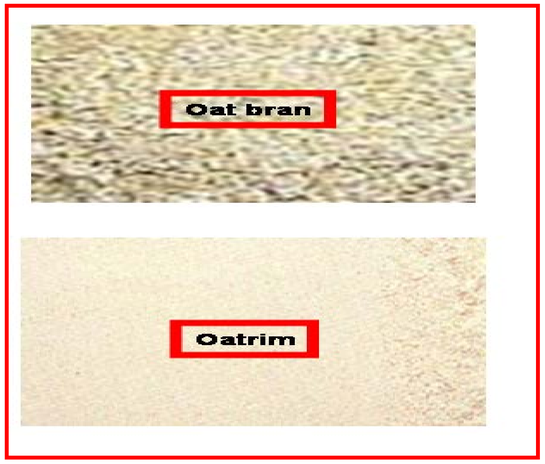
Fig 4: Dietary fiber levels in oat bran and oatrim beef patties



MONOUNSATURATED, POLYUNSATURATED & SATURATED FATTY ACID CONTENT IN OAT BRAN

MUFA	Oat bran Levels (%)		PUFA	Oat bran Levels (%)		Saturated FA	Oat bran Levels (%)	
	3	5		3	5		3	5
Oleic (18:1)	0.71g	0.118g	Linoleic (18:2)	0.079g	0.132g	Lauric (12:0)	0.001g	0.01g
			Alpha-Linolenic (18:3)	0.004g	0.006g	Palmitic (16:0)	0.034g	0.056g
						Stearic (18:0)	0.002g	0.004g

Data extracted from website: (www.nal.usda.gov/fnic/foodcomp.pl)



SUMMARY

- Control (100% beef) patties had significantly higher cholesterol levels than oatrim or oat bran-enhanced patties
- Total fat (g/100g) was significantly higher in beef control (7.78g) than in oat bran (7.04-6.90) and oatrim (5.16-5.28) patties.
- Total fat was higher (P<.05) in oat bran than oatrim. Total fat was higher in oat bran patties because of the significantly higher polyunsaturated and monounsaturated values.
- Monounsaturated and polyunsaturated fatty acids were significantly higher in oat bran than in oatrim and control patties.
- Saturated fat was higher P<.05) in beef control than in oatrim and oat gum patties, suggesting fat replacement contributed positively to the decrease in treated patties.
- Oat bran patties were significantly higher in saturated fat than in oatrim patties.
- Contribution of calories from fat was significantly higher in beef control than in oatrim and oat bran patties.
- Oatrim patties had the lowest total fat and caloric content.
- Dietary fiber was significantly higher in oat bran than in oatrim patties.

CONCLUSIONS

- Data suggest that oat bran at 3% or 5% can positively impact the polyunsaturated and monounsaturated fatty acid and dietary fiber content of beef and therefore could be instrumental in promoting good heart health and decrease cancer in American consumers.
- The results imply that oatrim when used as a fat replacement in beef patties can be useful in a low-fat dietary regime and could also decrease cholesterol in blood and promote good heart health.

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