Development and quality evaluation of value added instant *rab* mixes

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Abstract *Rab* is a traditional Rajasthani preparation prepared by boiling maize grits and or flour in buttermilk for 2–3 h. It is sour in taste with curd and cumin seed flavour and has thick soup like consistency. Two instant mixes of *rab* were developed using two types of curds prepared from two different culture combination (i) *S. lactis*+*S. thermophilus*+*S. diacetylactis* and (ii) *L. bulgaricus*+*S. diacetylactis*. Processed greengram dhal and spinach leaves powder were added to the mixes for their value addition. In all, six mixes were developed from two types of curd. The mixes were analysed for nutritional composition at zero month and sensory characteristics and shelf life was evaluated for 4 months. The *rab* mixes provided moisture 4.0–5.5 g; protein 15.1–17.6 g; carbohydrate 62.3–70.29 g; energy 357–394 kcal; fat 4.4–6.1 g; iron 3.15–3.89 mg and calcium 346–386 mg per 100 g of mixes. There was an increase in protein, ash, fiber and iron content of mixes through value addition. Sensory evaluation of *rab* reconstituted from mixes revealed that the scores ranged between 7 and 8 depicting that *rab* was liked very much. The mixes were free from coliforms and *S.aureus* bacteria and the counts for TVC, yeast and molds were within safe limits during storage of 4 months at 28–30°C and RH 55–65%.

Keywords *Rab* · Quality evaluation · Shelf life · Instant mix · Nutrient composition · Convenience food

Introduction

The trend in consumption of convenience food is increasing day by day due to urbanization, increase in working women population and per capita income, scarcity of household labors, lack of time, hectic schedule and availability of packaged foods. Today's consumer is looking for convenient, commercially available, culturally acceptable, nutritive and minimally processed food with longer shelf life. Traditional foods being rich in nutrients are also attracting the people today but most of them have longer methods of preparation. *Rab* is one such traditional item relished by people of all age groups. It is a thick soup like salty product with mild acidity. It is prepared by boiling maize grits and/or flour in buttermilk for 2–3 h. Since the preparation time is lengthy and the product has low shelf life of 2 days only, the marketability of the product is restricted. Hence an attempt has been made to develop an instant mix of *rab* and its value addition through incorporation of green gram dhal and spinach leaves so that it can fulfill today's demand.

Material and methods

Raw ingredients Maize (*Zea mays*), iodized salt and cumin seeds (*Cuminum cyminum*) were purchased from the local market in a single lot. Maize grains were cleaned for the impurities like sand and stones and powdered to a mesh size of BSS 100, cumin seeds were roasted for two minutes and powdered finely. Toned milk (1.5% fat and 8.5% SNF) was purchased from a government dairy *Udaipur Dugdh Utpadak Sangh*, Udaipur as and when required for curd making in *rab* preparation. Green gram dhal was cleaned, washed, boiled and sun dried. Spinach leaves were cleaned to

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remove dust, dirt and damaged portions. Leaves were washed, chopped and shade dried for value addition.

Preparation of curd Curds were prepared and standardized in the laboratory using sixteen different combinations of culture media inoculated in milk and incubated at different temperatures and time periods. Toned milk was heated and cooled to room temperature (32 °C) and divided into two parts. One part was inoculated with *S. lactis*+*S. thermophilus*+*S. diacetylactis* culture (1%—Curd 1) while the other part was inoculated with pure cultures of *L. bulgaricus*+*S. diacetylactis* (2%—Curd 2) and incubated at 37°C for 19 h to set the curd of desired consistency and flavour. On the basis of results of curd development such as color, texture, flavour, taste, body and titrable acidity, two best acceptable culture combinations viz. *S. lactis*+*S. thermophilus*+*S. diacetylactis* (1%—Curd 1) and *L. bulgaricus*+*S. diacetylactis* (2%—Curd 2) were selected to prepare curd under study as per the opinion of panel members.

Preparation of rab Traditional recipe for *rab* preparation was standardized. Hundred gram of curd (1 and 2) was beaten individually and 100 ml of water was added to prepare buttermilk. Twenty grams of maize flour was mixed uniformly. The mixture was boiled for 25 min till the characteristic flavour developed. About 2 min before the end of cooking, salt and cumin seed powder were added. *Rab* 1 and *Rab* 2 so obtained were evaluated for sensory characteristics by a panel of 10 trained judges using 9 point Hedonic scale (Williams 1989) where 9 indicated liked extremely and 1 disliked extremely.

Preparation of instant rab mix *Rab* (*rab* 1 and 2) was prepared in bulk following traditional standardized recipe, cooled to room temperature and dried in an indirect solar tray drier for 18 h. Dried sheets of *rab* were pulverized to mesh size of BSS 100. Since during the preliminary trials it was observed that the addition of salt and cumin seed powder before drying resulted in dried *rab* with little bitter taste and undesirable color, the same were packed separately and added during reconstitution of *rab* from mixes.

Value addition The *rab* mixes 1 and 2 were divided into three parts each. In one part, varying amounts of processed green gram dhal (5, 10, 15, 20 and 25 g per serving of 25 g of mix) was added. Spinach leaves (1, 1.5, 2, 2.5 g) along with 10 g of green gram dhal were mixed with other part while third portion remained plain. These mixtures were reconstituted and served to panel members to assess the acceptable amount of dhal and spinach leaves powder in *rab* mixes. In all, six varieties of *rab* mixes i.e. (i) plain *rab* mix, (ii) *rab* mix with greengram dhal and (iii) *rab* mix with greengram dhal and spinach leaves were developed from curd 1 and 2 each.

Packaging and storage Developed *rab* mixes were packed in polypropylene (pp75µ) paper (42 GSM) aluminium foil (20 µ) polyethylene laminate pouches (15×15 cm) of 100 g capacity and hermetically sealed. Forty eight pouches of mixes were prepared and stored at room temperature (28–30 °C, RH 55–65%) for 4 months to study quality characteristics. Salt and cumin seed powder were packed separately in small pouches and inserted into the packets of mixes to be mixed at the time of cooking. This also enables the end user to use required quantity at per the individual's taste.

Quality analysis

Physico chemical characteristics Curd was analysed for titrable acidity (Atherton and Newlander 1982), total solids (Nielson 1994) and pH. *Rab* mixes were analysed for moisture (AOAC 1990), protein (N x 6.25), fat, ash and fibre contents (Raghuramulu et al. 1983), total carbohydrates (Gopalan et al. 2002). Total energy was calculated by multiplying protein, carbohydrate and fat contents by 4, 4 and 9. Mineral composition was determined by atomic absorption spectrophotometer. Nutrient composition of *rab* mixes was analysed at 0 month while bulk density (Upadhyay 2000) for a period of 4 months of storage.

Reconstitution and sensory evaluation Finally developed mixtures were evaluated for their acceptability. Initially 1:10, 2:10, 2.5:10 and 3:10 parts of *rab* mix to water were used for reconstitution. Powder was slowly added to boiling water and contents were cooked for 2–8 min. Cumin seed powder and salt were added and served to the panel for sensory evaluation.

Shelf life Shelf life of instant mixes was assessed to determine its wholesomeness, safety in consumption and storage stability. Packed samples were kept in aluminum container from May, 15th to September, 15th 2001. Three samples of each mix were removed initially and at every month of storage and analysed for reconstitution properties, sensory characteristics and shelf life. Moisture, peroxide value, load of total viable counts, yeast and moulds, *E.coli* and *staphylococci* (ISI 1981) were examined every month during the entire storage period.

Statistical analysis Mean and standard deviation were calculated for proximate composition and mineral contents using three replicates. Student's *t*-test was used to find out the difference in sensory qualities due to difference in type of curd. Analysis of variance (Snedecor and Cochran 1967) was used to assess the effect of storage on shelf life of the products.

Results and discussion

Sensory evaluation of *rab* The acceptability of *rab* depends upon the sourness and flavour of curd. Curd available in the market or prepared at home varies in taste and flavour. Curd prepared by same individual on different times also varies. To avoid these variations, the preparation of curd was standardized in the laboratory. Srinivasan and Rangnathan (1971) reported that curd prepared by using market curd as curd culture had significant increase in total bacterial count after 24 h of storage. The titrable acidity of standard curd 1 and 2 was 1.00 and 1.20% as lactic acid respectively. Cooked weight and volume of *rab* 1 and 2 were 204 and

210 g and 198 and 200 ml respectively. Sensory evaluation of *rab* revealed that the mean scores for color, flavour, taste, appearance and overall acceptability for *rab* 1 and 2 ranged between 7.0 and 8.0. These scores rank both the preparations between liked moderately to very much on a 9 point Hedonic scale. The sensory scores of *rab* prepared from curd 1 and 2 were not significantly different ($P < 0.05$) and hence *rab* mix was prepared using both the types of curd.

Preparation of *rab* mix Prior to the preparation of *rab* mix in bulk, preparation of mix and its reconstitution procedure were tested on one serving of the product for *rab* 1 and 2 each. One serving of *rab* 1 and 2 yielded 25 g of mix after

Fig. 1 Development of *rab* mix

drying in a solar drier for 17.45 h. Details of preparation of plain *rab* mixes in bulk have been presented in Fig. 1. It is evident that from 1 kg of maize flour, after cooking with 10 l of buttermilk (curd 1 and 2 separately) for two and half hours and drying of 18 h, 1.435 and 1.437 kg of mix 1 and 2 were obtained (Table 1). Dehydration ratio was 4.58 and 4.60. These results showed that two different types of curd yielded almost same amount of mix.

Value addition of *rab* mix Results of sensory evaluation of reconstituted *rab* containing varying amounts of green gram dhal and spinach leaves powder in value added mixes revealed that the preparations containing 10 g of greengram dhal and 2 g of spinach leaves powder plus 10 g greengram dhal powder were the most acceptable combinations as per the panel members. Details are presented in Fig. 2a and b.

Sensory evaluation A ratio of 1:10 parts of mix and water was adjudged best by the judges for reconstitution. Mean scores of reconstituted *rab* mixes plain, dhal and dhal spinach for color, flavour, taste, appearance and overall acceptability ranged between 7 and 8 for different sensory characteristics indicating that the products were liked moderately to very much (Table 2). There was a significant change in color and flavour of *rab* reconstituted from *rab* mix plain and *rab* mix

with spinach as spinach leaves imparted green color and its flavour but it was acceptable by the panel. According to Singh et al. 2006, aroma and flavour of vegetables can change after drying due to loss of volatile organic compounds.

Nutrient composition Plain and value added *rab* mixes provided moisture 4.0–5.5 g; protein 15.1–17.6 g; carbohydrate 62.3–70.29 g; energy 357–394 kcal; fat 4.4–6.1 g; iron 3.15–3.89 mg and calcium 346–386 mg and phosphorous 391.66–416.60 mg per 100 g. There was a significant ($p<0.05$) increase in protein, ash, fiber and iron content of mixes through value addition (Table 2). Kowsalya and Vidhya (2004) reported that food preparations enriched with dried vegetables had higher values for protein, fibre, iron and calcium. Similar findings have been reported by Naik (2004) and Sood (2004). The mixes were good sources of most of the nutrients and major share of energy came from protein and carbohydrates. There was no significant difference ($p<0.05$) between the nutrient content of plain mixes prepared with two different curd which indicated that type of starter culture did not affect the nutrient content. Methionine and cysteine were the most limiting amino acids but their scores were higher when compared with FAO/WHO (1973) reference pattern. Net dietary protein calories (NDPcal percent) of the mixes were more than 14% which reflect that mixes were having good quality protein. FAO/WHO (1973) has recommended NDPcal as 8% for children for their growth and maintenance and 5% for adults.

Bulk density It is also known as apparent or packing density, measures the amount of *rab* mixes which occupies the fixed volume. It is affected by the size of the particles as well as the way in which particles pack together. Loose bulk density of plain *rab* mix 1 and 2 was 0.663 and 0.661 ml while it was minimum for mixes with dal spinach (0.520 and 0.512 g/ml). Packed density of plain mix 1 and 2 was higher i.e. 0.791 and 0.813 g/ml in comparison to 0.748 and 0.730 g/ml for mix 1 and 2 dhal and 0.616 and 0.590 g/ml for mix 1 and 2 with dhal spinach respectively. It was concluded that for a given mass, plain *rab* mixes occupy lesser volume indicating that more amount of mix could be packed in a given size of packet in comparison with mixes with dhal and spinach powder.

Reconstitution of instant mixes Twenty five gram of each instant *rab* mix was reconstituted in 250 ml of boiling water (one serving). *Rab* could be easily and uniformly reconstituted within two minutes without any lump in the final product. Total time required to reconstitute the *rab* mixes was 2–8 min, plain mixes required less time than the other counterparts. Cooked weight and volume of the reconstituted *rab* did not differ by type of mix and storage. Total solid percentage of reconstituted *rab* samples ranged from 14.60–17.60 g/100 ml. The storage period also did not affect the reconstitution

Table 1 Details of instant *rab* mix preparation from 1 kg of maize flour

Details	Instant <i>rab</i> mixes	
	<i>Rab</i> mix 1	<i>Rab</i> mix2
Ingredients:		
(a) Maize flour (kg)	1	1
(b) Curd (kg)	5	5
(c) Water (litre)	5	5
(d) Salt (g)	56	56
(e) Cumin seed powder (g)	60	60
Cooked weight of <i>rab</i> (kg)	6.578	6.674
Cooked volume (l)	6.96	7.214
Cooking time (hrs)	2.3	2.3
Viscosity (cm)	1.2	1.2
Sunshine (hours)	11	11
Day's temperature:		
Maximum (°C)	35.3–42.0	35.3–42.0
Minimum (°C)	21.8–26.8	21.8–26.8
Temperature of solar dryer (°C)	38–55	38–55
Drying time (hrs)	18	18
Instant mix obtained	1.435	1.437
Moisture (%)	78.18	78.31
Dehydration ratio	4.58	4.6

Values are mean of three observations

Fig. 2 a: Processing of ingredients to develop nutrified mixes **b:** Nutrification of instant rab mixes per 100 g

behavior, total solids and viscosity whereas pH value decreased and titrable acidity increased on storage.

Sensory evaluation of reconstituted rab during storage Scores for different sensory attributes i.e. color, flavour, taste, appearance and overall acceptability during entire storage period ranged between 7 to 8 before storage and did not differ significantly ($p < 0.05$). Mean acceptability scores for rab reconstituted from mix 1 and 2 ranged from 7.6–8.3 during storage of 4 months. Effect of storage on acceptability of rab was also not significant ($p < 0.01$). Adegoke et al. (1995) reported the similar results on storage of maize based fermented beverage.

Effect of storage on moisture content The change in moisture content did not follow a linear trend (Table 3). During storage, moisture content increased from 0.24–0.31 g per cent with a maximum moisture content of 5.99%. The

variation in moisture content may be dependent on external temperature and RH during storage. Diffusion of gases and vapor through packaging material may be responsible for increase in moisture content (Palling 1980; Shetty et al. 1996). Rao (1980) reported that if product contains less than 9% of moisture, it is safe for storage. Malleshi et al. (1989) observed that malted ragi products could be safely stored for 100 days at the moisture level of 11%. According to Shanti et al. (2000) small quantity of free water in dried food product do not support the growth of microorganism and the cell dies. Pathogenic bacteria cannot grow below aw of 0.85–0.86 whereas yeast and moulds are more tolerant to a reduced water activity (Sablani 2006).

Effect of storage on peroxide value There was no rancid odor in the mixes when stored at room temperature for a period of 4 months and the peroxide values were nil in the fat extracted from each mix at every month of storage.

Table 2 Sensory and nutritional quality of instant *rab* mixes

Quality attributes	Rab mix 1			Rab mix 2		
	Plain	Dhal	Dhal and spinach	Plain	Dhal	Dhal and spinach
Color	7.9±0.22	7.7±0.03	7.3±0.05	7.7±0.22	7.8±0.2	7.4±0.18
Flavour	7.5±0.35	7.7±0.08	7.4±0.03	7.1±0.22	7.6±0.14	7.5±0.20
Taste	7.9±0.20	8.1±0.09	7.4±0.03	7.8±0.27	7.9±0.18	7.5±0.20
Appearance	7.9±0.18	7.9±0.05	7.4±0.03	7.7±0.24	7.6±0.18	7.4±0.20
Overall	7.7±0.27	7.8±0.06	7.4±0.06	7.8±0.24	7.7±0.20	7.3±0.22
Mean	7.8±0.19	7.8±0.16	7.2±0.05	7.5±0.25	7.7±0.20	7.4±0.20
Moisture (g)	4.1±0.24	5.5±0.03	4.7±0.10	4.0±0.04	4.2±0.08	5.2±0.05
Energy(kcal)	394 ±3.51	381±3.58	357±2.10	389±3.12	384±3.8	360±0.06
Protein(g)	15.8±0.50	16.6±0.07	17.3±0.30	15.1±0.61	15.8±0.1	17.0±0.52
Fat(g)	6.1±0.56	4.7±0.10	4.6±0.19	5.8±0.63	4.4±0.1	4.6±0.18
Ash(g)	3.3±0.04	3.1±0.03	8.8±0.30	3.4±0.05	3.2±0.11	8.4±0.18
Fibre(g)	1.8±0.07	1.7±0.06	2.2±0.05	1.9±0.07	2.0±0.11	2.2±0.10
CHO (g)	68±0.90	381±3.5	62.3±0.30	69±0.86	70.3±1.10	62.5±0.28
Iron (mg)	3.6±0.01	3.1±0.12	3.8±0.46	3.89±0.14	3.2±0.12	3.50±0.31
Calcium(mg)	460.0±11.22	347±7.7	350±7.70	486±11.56	347±8.70	346±12.20
Phosphorus (mg)	416.6±9.33	367±16.27	377±19.2	392±11.16	398±15.60	371±8.63

N=30 for sensory quality and *n*=3 for nutritional analysis, values are mean±SD

Total viable counts The presence of total viable micro-organisms in dried food is the net result of microbial contamination of the raw material, handling and the

type of sanitary control exercised during its production, processing, transportation and storage. In the present investigation care was taken to maintain environmental

Table 3 Shelf stability of instant *rab* mixes

Instant Mixes	Microbial load* (log cfu/g)	Storage months				
		0	1	2	3	4
Mix 1 Plain	Moisture (%)	4.15±0.02	4.75±0.02	4.83±0.05	4.60±0.07	5.46±0.11
	TVC	2.95	2.90	2.90	2.86	2.77
	Y&M	2.30	2.20	2.21	2.20	2.13
Mix 1 dhal	Moisture (%)	5.51±0.04	4.43±0.01	4.19±0.14	5.9±0.04	5.9±0.05
	TVC	2.95	2.95	2.93	2.84	2.84
	Y&M	2.88	2.51	2.38	2.01	2.01
Mix1 dhal and spinach	Moisture (%)	4.85±0.03	4.92±0.06	4.90±0.05	5.41±0.28	5.25±0.14
	TVC	2.95	2.93	2.93	2.91	2.90
	Y&M	2.42	2.40	2.36	2.36	2.32
Mix 2 Plain	Moisture(%)	4.85±0.03	4.92±0.06	4.90±0.05	5.41±0.28	5.25±0.04
	TVC	3.0	3.0	2.95	2.90	2.89
	Y&M	2.41	2.34	2.23	2.23	2.11
Mix 2 dhal	Moisture (%)	4.29±0.03	4.35±0.01	4.60±0.04	4.05±0.13	5.15±0.05
	TVC	2.98	2.95	2.94	2.91	2.90
	Y&M	2.47	2.40	2.34	2.30	2.31
Mix2 dhal and spinach	Moisture (%)	5.08±0.07	4.95±0.04	4.93±0.09	4.22±0.27	5.32±0.16
	TVC	2.94	2.90	2.86	2.86	2.73
	Y&M	2.46	2.45	2.45	2.43	2.43

TVC Total viable count; *Y&M* yeast and mold: **Staphylococcus* and coliforms were nil
n=3 replicates

and personnel hygiene to reduce the contamination during the preparation and storage of *rab* mixes. Microbial examination (Table 3) revealed that the load of micro-organism decreased from initial values. The total viable count in all the *rab* mixes plain and value added decreased during storage period and load of microorganism was within the ISI specification for cereal based weaning food (Anon 1969).

Yeast and mold counts Yeast and mold counts of *rab* mixes 1 and 2 plain ranged from 2.3 to 2.0 log cfu/g and 2.41 to 2.11 log cfu/g while mixes 1 and 2 with dhal and spinach contained 2.42–2.32 cfu/g and 2.46–2.43 cfu/g respectively. These results indicated that the yeast and mold count decreased during storage period revealing microbial safety of the product.

Coliform A functional group of micro-organism, presence of which in food material is a definite indicator of fecal contamination and gross unhygienic condition during preparation, transportation or consumption. In both the *rab* mixes during entire period of storage presence of coliforms was found nil.

Staphylococcus aureus These are the pathogenic micro-organisms responsible for causing food poisoning. No single mix was containing *S. aureus* during the storage of 4 months period. The above results depict that *rab* mixes developed were safe for consumption up to 4 months of storage due to low initial moisture percentage, hygienic conditions maintained during the process of development of mixes and appropriate packaging material used for storage.

Conclusion

Rab mixes prepared by using curd of two different culture were nutritious, acceptable and easy to reconstitute. Mixes could be stored safely for a period of 4 months at room temperature (25–37 °C). Presence of disease producing bacteria i.e. coliforms and *S.aureus* were found nil at the 4 months of storage.

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References

- Adegoke GO, Nwaigwe RN, Oguntimein R (1995) Microbiological and biochemical changes during production of *sekete*. J Food Sci Tech 32:516–518
- Anon B (1969) Specifications for processed cereal weaning foods. Indian Standard Institution, Manak Bhawan, New Delhi
- AOAC (1990) Official methods of food analysis. Association of Official Agricultural Chemists, Arlington
- Atherton HV, Newlander JA (1982) Acidity of milk and its products. In: Chemistry and testing of dairy products. AVI Publishing Inc, West Port
- FAO (1973) Energy and protein requirements. Report of Joint FAO/WHO adhoc expert committee. FAO/WHO, Rome
- Gopalan C, Ramasastri BV, Balasubramanian SC (2002) Nutritive value of Indian Foods. Revised and updated by Rao BSN, Deoshthale YG, Pant KC. (1989) National Institute of Nutrition, Indian Council of Medical Research, Hyderabad
- Indian Standard Institution (1981) Hand book of food analysis. Sp 18 (part 1), General methods. Indian Standard Institution, Manak Bhawan, New Delhi
- Kowsalya S, Vidhya MR (2004) Nutritive value of selected dehydrated green leafy vegetables. Indian J Nutr Diet 41:279–286
- Malleshi NG, Balasubramanyam N, Indiramma AR (1989) Packaging and storage studies on malted ragi and green gram based weaning foods. J Food Sci Tech 26:68–71
- Naik R (2004) Value addition of underutilized foods. XXXVI Annual report. Nutrition Society of India, Hyderabad
- Nielson SS (1994) Introduction to chemical analysis of foods. Jones and Bartlett Publisher, Boston
- Palling SJ (1980) Development in food packaging 1st edn. Applied Science Publishers Ltd, London
- Raghuramulu N, Nair KM, Kalyanasundaram S (1983) A manual of laboratory techniques. National Institute of Nutrition, Hyderabad
- Rao MS (1980) Vegetable protein products food industries. The chemical engineering education development centre. Indian Institute of Technology, Madras
- Sablani SS (2006) Drying of fruits and vegetables: retention of nutritional/functional quality. Drying Technol 24:428–432
- Shanti D, Manimegalai U, Chitra P (2000) Studies on the storage behavior of instant vada mix. Ind Food Packer 54:72–76
- Shetty CS, Bhasker N, Bhandari MH, Raghunath BS (1996) Effect of film forming gums in preservation of salted and dried mackerel. J Sci Food Agric 70:453–460
- Singh U, Sagar VR, Behera TK, Kumar PS (2006) Effect of drying conditions on the quality of dehydrated selected vegetables. J Food Sci Tech 43:579–582
- Snedecor GW, Cochran WG (1967) Statistical methods. Oxford and India Book House publishing Company, Kolkata
- Sood S (2004) Functional properties of cereal. XXXVI Annual report. Nutrition Society of India, Hyderabad
- Srinivasan KN, Rangnathan B (1971) Role of contaminating yeast in the spoilage of *dahi* during storage. J Food Sci Tech 9:35–37
- Upadhyay KG (2000) Advances in condensed milk. Dairy Tech Division, National Dairy Research Institute (Indian Council of Agricultural Research), Karnal
- Williams M (1989) Foods – Experimental perspectives. Macmillan Publishing Company, New York