

Representative nutrient analysis of spelt and rye flours for the German Nutrient Database

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Background

The German nutrient database „Bundeslebensmittelschlüssel“ (BLS) contains nutrient data of about 15,000 foods on the German market and serves as a basis for calculating nutrient intake in nutrition surveys. Currently, a comprehensive revision of BLS nutrient data is taking place, in which foods with a high contribution to the daily consumption of the German population are prioritized. These include foodstuffs produced from ground spelt (*Triticum spelta*) and rye (*Secale cereale*), such as bread, pastries and fine bakery products. In Germany, the flour types of spelt, rye and wheat have been standardized since 1991 according to DIN standard 10355 [1] and are based on their mineral content (in mg/100g dry matter). The aim of this work was to generate highly representative samples of these ground products using a comprehensive sampling plan and subsequently characterize their nutrient profile. Such an extensive study has not yet been carried out in Germany. It could be realized in cooperation with the Verband Deutscher Mühlen e.V. (Association of German Mills).

Materials and methods

The sampling plan was defined by the Federal office of Agriculture and Food dividing Germany into the four market regions North, East, West and South. Taking into account the different mill sizes and the origin of the raw materials from organic or conventional cultivation (fig. 1), 54 spelt samples and 112 rye samples were taken for a selection of four (spelt) and seven (rye) products (table 1) defined by DIN standard 10355 [1].

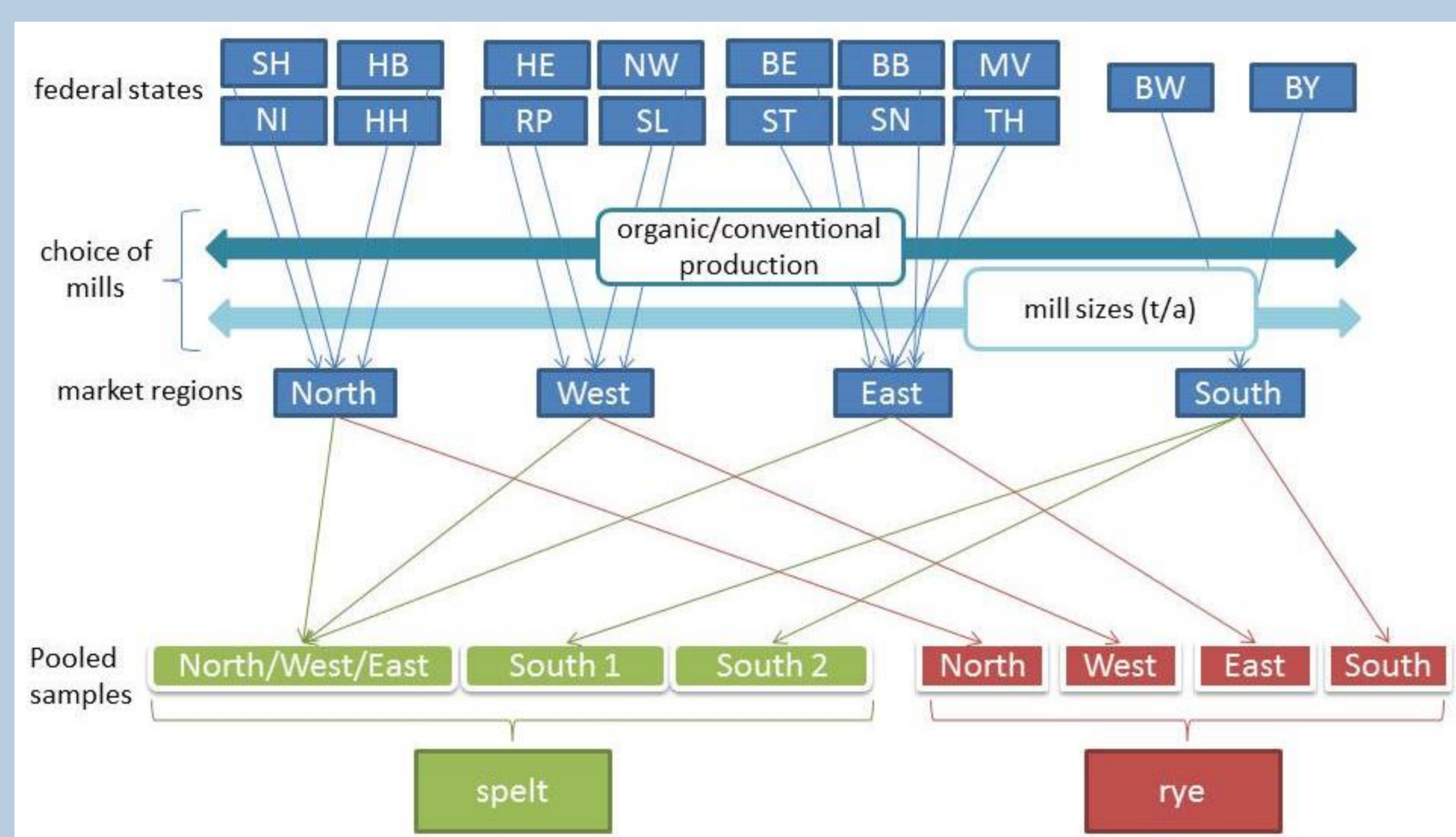


Figure 1: Sampling of representative mill products in cooperation with the Association of German Mills; Federal States abbreviated; factors influencing the selection of the mills were organic/conventional production and mill size given as the milled quantity of each mill (tons per year; t/a)

Ground products of the same region and type (primary samples) were pooled to laboratory samples according to their flour type and market region (table 1) and the contents of protein, fat, starch, water, ash, vitamins (thiamine, riboflavin, phyllochinone, folate, niacin, biotin, pantothenic acid and vitamin E), sulphur, amino acids and fatty acids were determined.

Table 1: Number of primary and laboratory samples for milled samples of spelt and rye; spelt type 812: a sample for all market region was pooled; spelt type 1050 and rye type 1740: no samples available for individual market regions

cereal	spelt				rye						
flour type	type 630	type 812	type 1050	wholemeal flour	type 815	type 997	type 1150	type 1370	type 1740	type 1800	wholemeal flour
N (primary samples)	18	6	12	18	11	23	24	18	5	10	21
n (laboratory samples)	3	1	2	3	4	4	4	4	2	4	4

Reference

[1] DIN 10355:2017-11; Mahlerzeugnisse aus Getreide - Anforderungen Typen, Prüfung, 2017: Deutsches Institut für Normung e.V. Berlin

Results

The analysis of all spelt and rye flour types and wholemeal flours according to the sampling plan for Germany enabled 420 new nutrient data to be generated for the eleven milled spelt and rye products in the BLS. Figure 2 shows examples of the results for individual macronutrients and selected vitamins depending on the flour type of the grain.

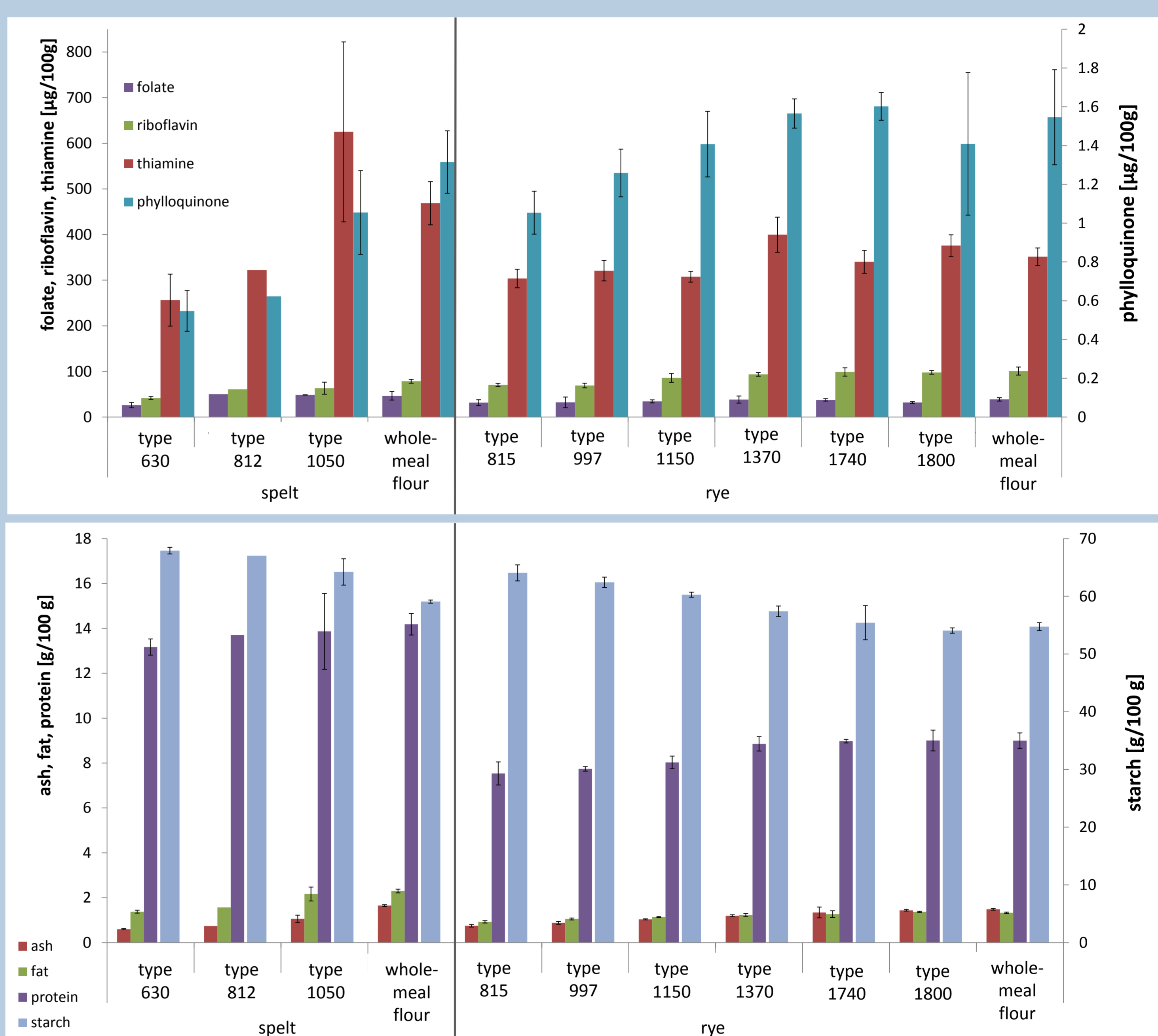


Figure 2: Macronutrients ash, fat, protein (N x 6.25) and starch; vitamin contents of folate (calculated as folic acid), riboflavin, thiamine (calculated as thiamine chloride-hydrochloride) and phylloquinone in milled products of spelt and rye; data presentation as mean of pooled laboratory samples (n=1-4) with standard deviation

The obtained analytical data are representative values of milled products of spelt and rye in Germany. In the course of new developments in the BLS, such as the restructuring of the BLS food items and the updating of the BLS nutrient definitions, existing data in the BLS were replaced and supplemented by new nutrient data.

Conclusion

The analytical data obtained for spelt and rye products represent a new and improved data basis, e.g. for the determination of nutrient intake in consumption studies using the BLS. Evaluations of further products from spelt and other husk cereals as well as rye are planned; a corresponding follow-up study on ground products from wheat will follow.