

## „Grodziskie redivivus” Project

[report on the state of works of the PSPD (Polish Homebrewers Association) commission for the Grodziskie beer; January 2012]

The history of brewing on the territory of Grodzisk Wielkopolski has been documented – with better or worse results – for over 700 years. During this substantial period of time, brewers from this important brewing center, have worked on many different beer styles. Initial craftsmanship had been replaced by mass production in mid-16<sup>th</sup> century. This first industrial brewery here probably started by brewing beers popular at that time in this part of Europe – top-fermented light wheat beers. According to Warschauer [1], only during a couple of decades of the 17<sup>th</sup> century the grain bill changed substantially: at the beginning of the century Grodziskie beer had been brewed exclusively from wheat; in 1660 barley had been added in the proportion of 2 to 5 and in the coming years the beer had been brewed solely on barley. In 1686, brewers from Grodzisk Wielkopolski returned to the earlier wheat-based recipes, combining one part of barley malt with six parts of wheat malt.

Also in 1990s, at the end of this long road of Grodzisk brewing tradition, the last brewery in the town brewed a couple of different beer brands. Apart from the light, solely wheat-based Grodziskie 7,7 °Blg, there were Grodziskie Specjalne 12 °Blg, Grodziskie Specjalne 14 °Blg and dark Bernardyńskie 14 °Blg, supplemented with barley malt [2]. The production of the last three stronger beers had been the brewery’s attempt to improve its poor economic condition.

Out of all these beers, the one to be considered the most famous and prominent is the beer brewed with 100% wheat malt, kilned by a oak wood fire, light 7,7 (+/- 0,4) °Blg, with alcohol content below 2,5% m/m (3,1% vol.). It was this very beer that made Grodzisk Wielkopolski famous at the end of the 19<sup>th</sup> century and in the first half of the 20<sup>th</sup> century. It was also this beer that had been brewed in the largest quantities, amounting to even 100,000 hl annually at the turn of the centuries [2]. And it is exactly this and solely this Grodziskie beer that we would like to revive.

### INGREDIENTS

**Water.** It is said that the characteristics of the Grodzisk water made the local beer so special. After World War II, the last operating Grodzisk brewery at Poznańska Street, made use of its own two wells for supplying technological water. Szmelich [9] reports data proving quite hard water drawn from wells No 1 and No 2 at Poznańska Street:

well	hardness total	hardness permanent	alkalinity [as ppm CaCO <sub>3</sub> ]	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup> [ppm]	SiO <sub>2</sub> [ppm]	dry m. [mg/l]
#1	450	100	350	122	34	39	81	183	19	684
#2	430	105	325	121	31	32	67	145	21	688

**Malt.** Solely wheat malt, after World War II produced on location by floor malting, and dried exclusively at a malting plant at Przykop Street. It is special also because of the fact that when dried and cured on both floors of the kiln, the malt had been additionally constantly smoked by a oak wood fire. After the war, there has been a substantial change in the grain material: low-extract, high-protein species of wheat have been replaced by red species yielding a higher extract and of lower protein content. It may be concluded that wheat species does not seem crucial to the successful implementation of the project. It seems that the main question here is how intensely the malt had been smoked (the degree of malt smokiness). Unfortunately we lack data (or they still have not been found) on the content of phenols originating from the smoke, although recently the plant adopted a norm for its malt under the reference number ZN-65/A-1/T-2. An exemplary, typical analysis of Grodzisk malt according to Szmelich [8] reports the following parameters: moisture 6,5 %, extract fine grind (dry mass) 83,5 %, extract coarse grind 77,7 %, saccharification time 10-15 min., proteins total 13,4 %, proteins soluble 5,2 %, Kolbach index 39, color 5,3 - 5,6 EBC [8].

**Hops.** Brewers used hops planted in the closest surrounding, a very aromatic and highly valued since 19<sup>th</sup> century variety called Nowotomyski, with c.a. 5% content of alpha-acids. This variety probably remains available also today. But if not, one should use other aromatic varieties, like the Czech Zatec, Polish Lublin, German Hallertauer Mittelfrüh, or Tettnanger. Older sources [5] indicate using 3 kg of hops per every 100 kg of wheat malt; Szmelich [6] recalls that in the beginning of 1960s the proportion of the ingredients was 2,4 kg per 100 kg of malt or 270 g / hl of wort [9]

**Yeast.** Top-fermented. Grodzisk brewers deliberately used a mixture of at least two strains of yeast of different characteristics [7]. The selection of yeast seemed to be done based on technological, and not sensory characteristics. One yeast strain was of a high and early flocculating type, the other one was powdery. With both working simultaneously, the wort was fermented really fast, loosing ca 50 % of its extract during 60 hours. Then well flocculating strain switched off and gathered on the surface, and the fermentation slowed down tremendously. This was a clear signal for brewer to scoop off yeast from surface, to rack the beer, to add isinglass and to bottle usually a day later. Sometime before postponed bottling ca 10% v/v of “kraeusen” beer was added. After World War II, for unclear reasons, the brewery imported yeast from Berlin, from the Groterjan brewery, which brewed beer of Berliner Weisse style. The reasons were unclear, because Grodzisk brewery (breweries) continued operating during the II WW and there was no reason for losing their own strains. Groterjan yeast (often contaminated with lactic acid bacteria) did not adapt well to the Grodzisk conditions and in the beginning of 1960s it was decided that in order to avoid import only best strains of the working yeast shall be selected and cultivated. A different method was employed for propagation of the flocculating strain and a separate one for the powdery strain(s). The yeast was used at a 1:2 ratio, with powdery strains predominating. It seems that today one does not necessarily need to use such a complex yeast system, however it did provide technological comfort. It is very much probable that Grodzisk strains are still present in the collections of such institutions as the Technical University of Łódź (in the beginning of 1970s prof. Jadwiga Jakubowska worked with the above mentioned strains there), Institute of Agricultural and Food Biotechnology in Warsaw, Wrocław University of Environmental and Life Sciences, Lech Breweries in Poznań.

In order to modernize the process, in 1970s researches experimented with different strains of top-fermenting yeast, which were supposed to enable pressure fermentation in closed vessels. Among others they tried yeast used in Cologne (Gaffel) and Düsseldorf (Schumacher) beers. "Strain 86" from the Institute of Fermentation Industry was considered the most useful [8].

## TECHNOLOGY [4]

**Mashing.** 1500 kg of smoked wheat malt (100 %) was milled in two-roller mill. Infusion method: from premasher 20 hl of thick mash at 38 °C (break 30 minutes). Addition of 11 hl of hot (75 °C) water, so in 10 minutes the mash reached temperature of 52 °C. Break 30 – 60', depending on the malt modification. Addition of 24 hl of hot (98 °C) water during 20 minutes, to reach temperature of 70 °C (break 30 minutes). Final addition of 12 hl of hot water (98 °C), to rise temperature to 75 °C and transfer of the mash to lauter tun.

**Filtration.** Filtering layer formed during 30 minutes (hop cones addition to the lauter tun as a filtering aid was also reported in the past [3]). Wort was recirculated until clear and directed to the kettle. 60 hl (?) of first wort collected. Total amount of sparging water (75 °C) = 70 hl. Last spargings contained 0,8-1,2 % m/m of extract.

**Boiling.** Lasted 2-2.5 hours. Hopping - two additions: 80 % after 15 minutes of boiling and 20% 30 minutes before the end. The bitterness target was 20-22 IBU in final beer [3, 8]. Casting through the hop-back into a sedimentation tank (in 1950s there was a iron coolship [3]). The cast wort concentration 7,6 -7,7 % m/m [°B<sub>lg</sub>]. Loses in the brewhouse ca 9 % [8].

**Fermentation.** Wort was cooled down to temperature 14-16 °C and pumped to fermentation vessel (till 1950s wooden oak open fermentors, later on solid, layered with aluminium [3]). Pitching ratio 250 ml of yeast solids / 1 hl. On the first day dirty foam removed from the surface of fermenting wort. On the third day yeast collected from the surface. Primary fermentation ended on the third day and an apparent extract should be lowered to ca 3,8 % m/m.

**Beer clarification.** After yeast collection beer still containing ca 1,5 % of fermentable extract was transferred into clarification tank where solution of isinglass was added (1-1,5 l / hl). Eventually some other fermenting beer (in high kraeusen phase) was added in small amount (less than 10 % v/v) before bottling on next day.

**Bottling (maturing).** Beer from the clarification vessels was bottled directly, without filtration. Residual fermentation, carbonization and maturing took place for 3 – 5 weeks at temperature 14-18 °C in darkness.

**Final beer parameters:** real extract 2,8%, ethyl alcohol 2,5 % m/m. (3,1 % vol.), color 9 – 9,6 EBC u., acidity 1,3 ml 1M NaOH/ 100 ml, CO<sub>2</sub> 0,7% m/m. Fermentation byproducts [8]: acetaldehyde 0,9 ppm, ethyl acetate 8,7 ppm, n-propanol 13,9 ppm, izobutanol 24,5 ppm, amyl alcohols 50,4 ppm.

In order to retain the original style attributes, the following components / acts seem crucial:

- water of a similar content to the Grodzisk original
- wheat malt kilned by a oak wood fire
- aromatic hops of Polish, Czech or German origin (bitterness 20-22 IBU in beer)
- mashing schedule and boiling in accordance with the original procedure
- top-fermenting yeast (ideally strains used originally)
- clarification (by isinglass or gelatin)
- residual fermentation(or refermentation) in the bottle

**Sources:** [1] - A. Warschauer: "*Geschichte des Grätzer Bieres*" Zeitschrift der Historischen Gesellschaft für die Provinz Polen 8:333 (1893), [2] - T. Kaczmarek: „*Księga Piw i Browarów Polskich*” (1994) 266-274, [3] – Z. Zając: oral information, [4] – Grodzisk Wlkp. brewery technological instructions (years 1970s and 1980s), [5] – F. Schönfeld: „*Obergärige Biere Und Ihre Herstellung*” (1938) Berlin Verlag P. Parey, [6] – W. Szmelich: “*Zagadnienie drożdży do produkcji piwa grodziskiego*” *Przemysł Fermentacyjny* 11 (1963) 262-268 [7] - J. Jakubowska: „*Some Biochemical Features of Flocculent and non-Flocculent Yeast Used In the Top Brewery in Grodzisk Wlkp.*” *Acta Microbiologica Polonica ser.B* 1972 4 (21) 111-118 [8] W. Szmelich: „*Próby unowocześnienia technologii produkcji piwa Grodziskiego*” (praca doktorska, ph.d. thesis) Politechnika Łódzka (1974), [9] W.Szmelich: “*Próby zmiany w leżakowaniu piwa grodziskiego*”, *Przemysł Fermentacyjny i Rolny*, 1, 11-15 (1966)