

## Article

# The Quality of Lip Balm Produced with Grape Pomace Addition

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## Abstract

In recent years, there has been growing consumer interest in foods and cosmetics containing ingredients of natural origin. During the production process, a by-product of pomace is generated, which is regarded as a dispensable product by the food industry. However, studies have clearly indicated that fruit and vegetable pomace is a valuable source of many nutrients, whose beneficial effects on human health and appearance may represent an added value in its secondary use. Incorporating pomace into cosmetic products enhances their aesthetic value and can enrich them with naturally occurring polyphenols, which is in line with the circular economy model. In the present study, we determined selected mechanical properties of lip balms containing different amounts of grape pomace, for example, the kinetic friction against artificial leather, hardness, penetration performance, maximum shear force, and sample penetration resistance. Moreover, the antiradical activity against DPPH and the total phenolic content were determined, and the colour parameters were analyzed. All tests were conducted on lip balm samples containing 1, 3, and 5% fruit pomace and a control sample. Analysis of the penetration performance showed no statistically significant differences between the individual samples. However, differences in the values of other physical properties were noted. Moreover, the antiradical activity against the synthetic radical DPPH and the total phenolic content increases the value of lip balms with increasing amounts of pomace added. The colour of the lip balms also darkens with increasing amounts of pomace added. The innovative use of grape pomace is in line with sustainable development, and its properties enhance the effects of lip balms.

**Keywords:** pomace; lip balm; sustainable production; cutting; penetration; cosmetology



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## 1. Introduction

Each season, up to 630,000 tonnes of pomace are produced, which is a superfluous product generated in the production of currently fashionable smoothie-type drinks [1,2]. The reuse of these products poses a major problem in the processing industry. However, grape pomace, thanks to its abundance of cinnamic and benzoic acids and flavonoids (catechin, epicatechin and their coloured polymers and esters, flavanones, of which quercetin is the best known, as well as red and blue anthocyanins), is an excellent additive characterised by high antioxidant activity, which can find application in the production of both functional foods and cosmetics [3,4].

Anthocyanins (ACNs) of natural origin, derived from fruit and vegetables, have been demonstrated to provide a wide range of shades as lipstick pigments with high stability [5–7].

Intense and appealing colours produced by ACNs have sparked interest in their use as colouring agents in the food, pharmaceutical, and cosmetic industries [5]. Their potential to act as strong antioxidants and to be used in disease prevention is also gaining increasing attention [6], and they are considered to be strong antioxidants with an ability to scavenge free radicals and terminate chain reactions, as demonstrated in numerous *in vitro* tests [7,8]. Researchers have also demonstrated their protective action against oxidative stress-induced damage and regulation of redox signalling pathways [9–11]. It has also been confirmed that unabsorbed ACNs may act as topical chemopreventive agents in the gastrointestinal tract, preventing oxidative damage to the mucosa [12]. Research into the potential of ACNs to prevent skin damage due to ultraviolet (UV) radiation-induced erythema, skin cancer, and photoageing has also revealed protective effects *in vitro* and *in vivo* [12–16]. Photoageing is defined as premature ageing of the skin caused by repeated exposure to UV radiation, with symptoms including general deterioration of the skin condition and dark spots or abnormal pigmentation of the skin [16,17]. It has been demonstrated that ACNs can exert a regenerative effect on the skin [18]. In addition, they have been shown to improve and alleviate psoriatic lesions *in vitro* and atopic dermatitis *in vivo* [14–20].

In cosmetic preparations, the chemical composition and potential bioactive properties of ACNs can translate into anti-photoaging properties. When these are added to certain cosmetic preparations, consideration must also be given to the colour imparted by these pigments (not always a desirable process) as well as their stability. It has also been shown that ACNs are effective colouring agents in lipstick preparations, with stability comparable to that of synthetic compounds [21–23].

Developing an ideal lipstick formula that can be an instant commercial success may be difficult, considering the number of compounds that need to be incorporated in appropriate amounts. This formula will very often be based on a number of considerations regarding both raw material costs and the marketing aspects. The lipstick formulation is, therefore, complex and sometimes time-consuming. It is a highly technological product whose formulation has to be constantly updated, as it is dependent on fashion and currently even on environmental trends [24]. The current global trend in the production of cosmetics is to use natural and organic ingredients. The aim is to develop the simplest and most balanced cosmetic formulation, free of water and based on a small number of ingredients, mostly of natural origin and safe for health and the environment (Figure 1) [25].



**Figure 1.** Test material with individual pomace additions of 1, 3, and 5% (including the visible uneven distribution of particles) and the control sample.

For the purposes of the study, grape pomace was selected as an additive whose properties can enhance the characteristics of protective lip balms. It is an interesting additive due to the growing consumer interest in natural ingredients in the cosmetics industry. Grape pomace (GP) is a by-product of the winemaking industry. GP consists mainly of skins, seeds, and stems and accounts for approximately 20–25% of the weight of grapes pressed for wine production. Grape seeds are rich in extractable phenolic antioxidants, e.g., phenolic acid, flavonoids, procyanidins, and resveratrol, while grape skins contain large amounts of ACNs. The health benefits of GP polyphenols are attracting considerable interest from scientists, the food industry, and the nutraceutical industry. In addition to phenolic antioxidants, GP also contains considerable amounts of lipids, proteins, indigestible fibre, and minerals. Grape seeds contain 13–19% oil, which is rich in essential fatty acids, approximately 11% proteins, 60–70% indigestible carbohydrates, and non-phenolic antioxidants, such as tocopherols and beta-carotene [26].

The use of grape pomace as an additive in cosmetics represents a sustainable and environmentally friendly approach that is in line with the principles of the circular economy. In addition, grape pomace is high in polyphenols, which provide natural antioxidant and protective properties for human skin. Enhancing lip balm with this ingredient increases its value and exemplifies effective resource management and innovative biomass recycling [4].

## 2. Materials and Methods

The aim of this study was to develop a lip balm formulation (a control mixture with no additions) accounting for 100% of the basic ingredients. Subsequently, minced grape pomace was added to this mixture to produce lip balm formulations under laboratory conditions. The physico-chemical properties of these lip balms were then assessed. The balms obtained with the addition of grape pomace at proportions of 1, 3, and 5% in relation to the entire formulation were compared to the control balm with no fruit pomace added. The physical properties of the obtained balms were evaluated on the basis of the parameters of shear force, kinetic friction, and penetration force (resistance). In addition, the antiradical activity against DPPH·, the phenolic content, and the colour parameters of the obtained balms were assessed.

### 2.1. Material

The study used four different formulations for lip balms with various contents of grape pomace, and the control sample had no pomace added (Table 1).

**Table 1.** Ingredients for 100 g lip balms.

| Ingredients [g]        | Control Sample [S0] |
|------------------------|---------------------|
| Shea butter [g]        | 20                  |
| Cocoa butter [g]       | 20                  |
| Beeswax [g]            | 18                  |
| Sesame oil [g]         | 18                  |
| Coconut oil [g]        | 10                  |
| Bee honey [g]          | 8                   |
| Apricot kernel oil [g] | 6                   |

The lip balms were produced by dissolving the ingredients in a water bath and adding specific amounts of grape pomace to the individual samples (1, 3, or 5%). The pomace was derived from the following grapevine varieties: Hibernál, Jutrzenka, Muscaris, Seyval Blanc, Marechal Foch, Merlot, Regent, and Zweigelt. All three study samples were enriched

with an identical mixture of different grape pomace varieties, which were by-products of juice production. They were then pressed using a proprietary basket press with a capacity of 10 dcm<sup>3</sup> and equipped with a hydraulic pressing system. The fruit was pressed until a pressure of 0.6 MN was reached, and at this point, measurement was stopped. It was subsequently dried and ground to a fraction of 200 µm.

The prepared samples were poured successively into special lip balm containers previously coated with sesame oil on the inside (to ensure the microbiological stability of the resulting lip balms) while stirring continuously with a mixer.

## 2.2. Measurement of the Mechanical Properties of the Lip Balms

Lip balm samples with the addition of crushed pomace were subjected to a complex qualitative assessment by determining their mechanical parameters, e.g., kinetic friction, and measuring the maximum shear force and the resistance during sample penetration.

### 2.2.1. Measurement of the Kinetic Friction Force

The assessment of kinetic friction parameters for lip balms was carried out using cylindrical lip balm samples with a diameter of 10 mm ( $\pm 0.1$  mm), a height of 10 mm ( $\pm 1$  mm), and a weight of 1.42 g ( $\pm 0.05$  g). Friction force measurements for each sample were carried out on synthetic leather on a dry substrate. The sample load was 50 g. The force was determined dynamically after moving a sample by 1 mm. The measurements were carried out along a 100 mm path at a speed of 2.5 mm/s. All measurements were carried out at ambient temperature ( $22 \pm 1$  °C) and relative air humidity of  $40\% \pm 5\%$ . The measurements of friction were carried out on a modified friction test stand, as described in the previous study by the authors [27]. The modification involved altering the mounting and the movement of the sample to ensure better interaction with the dimensions and shape of the tested cylindrical samples while ensuring parameter stability during the measurements. These measurements were carried out according to the procedure developed by Stable Micro Systems: ‘Measuring bi-directional friction properties of materials using the Horizontal Friction System’. The measurement method was developed in compliance with the modified ASTM Standard Method D1894 [28]. The measurements were carried out in 10 replications.

### 2.2.2. Measurement of the Maximum Shear Force

The shearing test was performed using a Stable Micro Systems TA.XT.Plus instrument (Stable MicroSystems Ltd., Godalming, Surrey, UK) equipped with a 500 N measuring head. Similar to the friction test, the shearing process involved cylindrical lip balm samples with a diameter of 10 mm ( $\pm 0.1$  mm), a height of 10 mm ( $\pm 1$  mm), and a weight of 1.42 g ( $\pm 0.05$  g). The shearing test used a knife with a blade angle of 2.5°, extending all the way along the diameter of the sample. Shearing was performed with a knife while measuring the head speed of 5 mm·s<sup>−1</sup>. The maximum shear force values were recorded during the test, and the results were read from the force-displacement graph. All measurements were carried out at ambient temperature ( $22 \pm 1$  °C), and the tests were conducted in 10 replications.

### 2.2.3. Measurement of Resistance During Sample Penetration

A lip balm sample with the above-specified dimensions was subjected to measurement of the penetration force (resistance) using a TA.XT.Plus instrument equipped with a 500 N measuring head and a circular penetrator with a diameter of 2 mm. The penetrator travel speed was set at 1 mm·s<sup>−1</sup> in order to reach a depth of 10 mm. All measurements were carried out at ambient temperature ( $22 \pm 1$  °C), and the tests were conducted in 10 replications.

### 2.3. Antiradical Activity Against DPPH

Scavenging activity of the proteins and the protein hydrolysates against the DPPH radical was performed according to Brand-Williamis, Cuvelier, and Berset (1995). A total of 0.2 mL of the sample was mixed with 1.8 mL of 6  $\mu$ M solution of DPPH radical dot in 75% methanol. The absorbance of the sample was determined at 515 nm after 10 min of incubation (75% methanol was used as a blank). The scavenging activity of the samples was expressed as the percentage of the free radical-scavenging effect following the equation:

$$\text{Scavenging \%} = [1 - (\text{As}/\text{Ac})] \times 100$$

where As—absorbance of the sample and Ac—absorbance of the control (DPPH solution).

All assays were performed in triplicate [29].

### 2.4. Determination of the Total Phenolic Content (TPC)

The total phenolic content was determined using the method developed by Singleton et al. (1974). To 100  $\mu$ L of extract, 100  $\mu$ L of distilled water and 400  $\mu$ L of Folin–Ciocalteu reagent (diluted 1:5 with water) were added. After three minutes, 2500  $\mu$ L of 10%  $\text{Na}_2\text{CO}_3$  solution was added. The samples were mixed and left for 30 min at ambient temperature. After this time, the absorbance at a wavelength of 725 nm was measured. The concentration of phenolic compounds was read from a calibration curve established for gallic acid. The polyphenolic content was expressed in mg/g DW as gallic acid equivalent (GAE). The method demonstrates a linear relationship within the concentration range of 1–500  $\mu$ g/mL ( $r = 0.992$ ) [30].

### 2.5. Analysis of Colour Parameters

Lip balm colour was assessed using a CR 30–16 colourimeter (Precise Color Reader, 4Wave, Tychy, Poland) operating in accordance with the CIE Lab\* colour system. In this system,  $L^*$  indicates the colour lightness (from 0 to 100),  $a^*$  indicates the red and green values (from  $-150$  to  $+100$ ), and  $b^*$  corresponds to the blue and yellow values (od  $-100$  do  $+150$ ). The colour measurement was performed after spreading the same amount of the balm on a smooth white plastic spoon, and the colourimeter measuring head was then applied without touching the balm surface. The total colour difference ( $\Delta E$ ) was determined between the control lip balm and the balms enriched with grape pomace. Each measurement was carried out in five replications.

### 2.6. Statistical Analysis

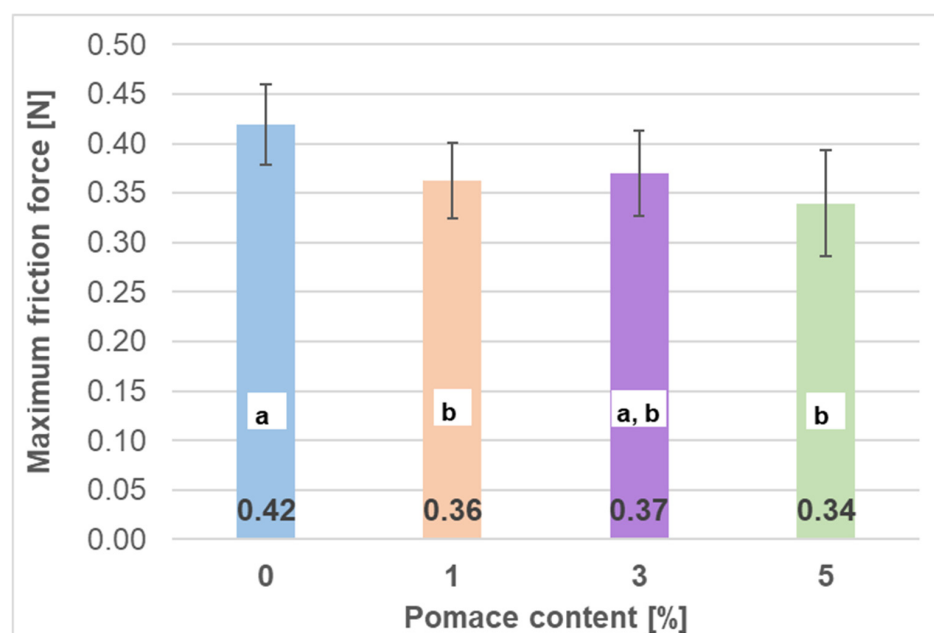
An analysis of test power and the minimum group size was conducted. The results obtained were subjected to a statistical analysis. The basic statistics were calculated, and an ANOVA analysis of variance was performed for the factors. In order to determine the significance of the differences, Tukey's test was performed, with the significance level assumed to be  $\alpha = 0.05$ .

## 3. Results

The laboratory tests in the present study were designed to determine whether the addition of grape pomace to a common product, i.e., a lip balm, can provide a valuable supplement to the lip balm's properties without adversely affecting its use or storage.

Figure 2 shows the results of the kinetic friction force measurements for the individual samples of lip balms with the addition of grape pomace within a range from 1 to 5%. Similar to the study by D. W. Rafferty et al. (2018) [31], lipstick friction testing was carried out using a friction measurement test method. However, the current results showed a different friction force of the sample with no pomace added and a slight difference between

the friction of the individual samples enriched with the grape pomace additive. On the other hand, in the study by D. W. Rafferty et al. (2018) [31], the authors performed a total of 12 tests (passes) in order to condition the lipstick and monitor the contact area, which is the key parameter in friction measurements.

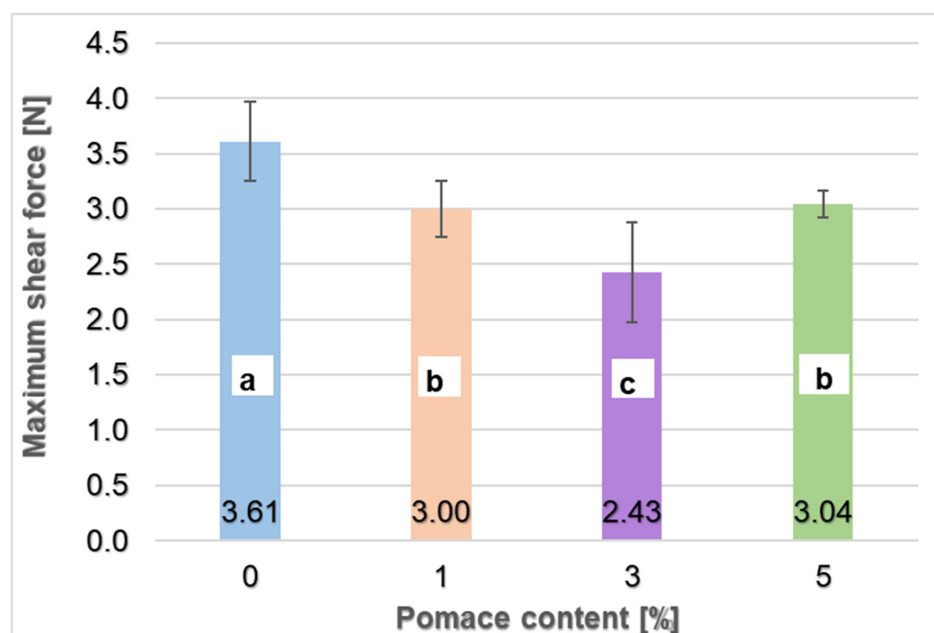


**Figure 2.** Measurements of the kinetic friction force for the individual samples, along with statistical deviations and homogeneous groups (the same letters indicate membership of one homogeneous group at  $\alpha = 0.05$ ). a,b-homogeneous groups.

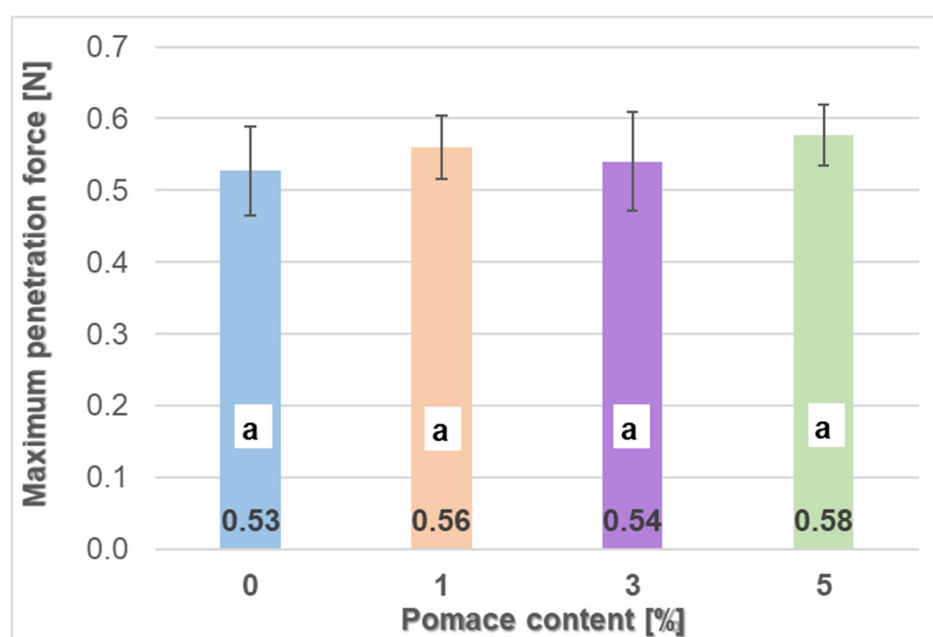
Figure 3 shows the results of shear force value measurements for the individual samples. The graph shows that the control sample had the highest maximum shear force of 3.61 N, while the shear forces recorded for the lip balms with pomace were 3.0, 2.43, and 3.04 N, respectively. The reason behind the different shear force values in lip balms with different proportions of pomace added may be that the shearing blade encountered pomace particles embedded in the test material. Similar results were obtained by Łusiak et al. (2024) in a study conducted on soaps with apple and carrot pomace added. Pomace particles act as points of continuity disruption in the soap matrix, forming specific micro-cracks and lower cohesion zones in which the material is easier to cut/separate. During the cutting test, lip balm enriched with grape pomace behaves like a porous/heterogeneous material, which may result in a change in resistance during cutting [32].

Figure 4 shows changes in the penetration force (resistance) of the samples tested. The control sample showed a resistance value of 0.53 N, whereas the other resistance values were as follows: 0.58 N for the sample with a 5% addition of pomace, 0.54 N for the sample with 3% pomace content, and 0.56 N for the sample with 1% addition. The value of penetration resistance, similar to the shear force, is a parameter determined by the hardness, plasticity, or brittleness of the material. It can be clearly stated that the addition of pomace does not have a statistically significant effect on the penetration force of the tested samples. Both the lip balms with no pomace added and those with the addition of pomace are exceptionally soft. The hardness of lip balms is generally determined by the type and amount of waxes in the formulation, oil polarity, and the oil-to-wax ratio. Solid lipsticks acceptable for consumers should have a strength of at least 30 g (gf) at 20 °C (0.294 N) for sticks with a diameter of 8.1 and 12.7 mm, according to the report on current patented

lipsticks. Therefore, the hardness values for all lip balms were considered acceptable, as the values obtained were higher than those of the commercial formulation or above 30 gf [33].



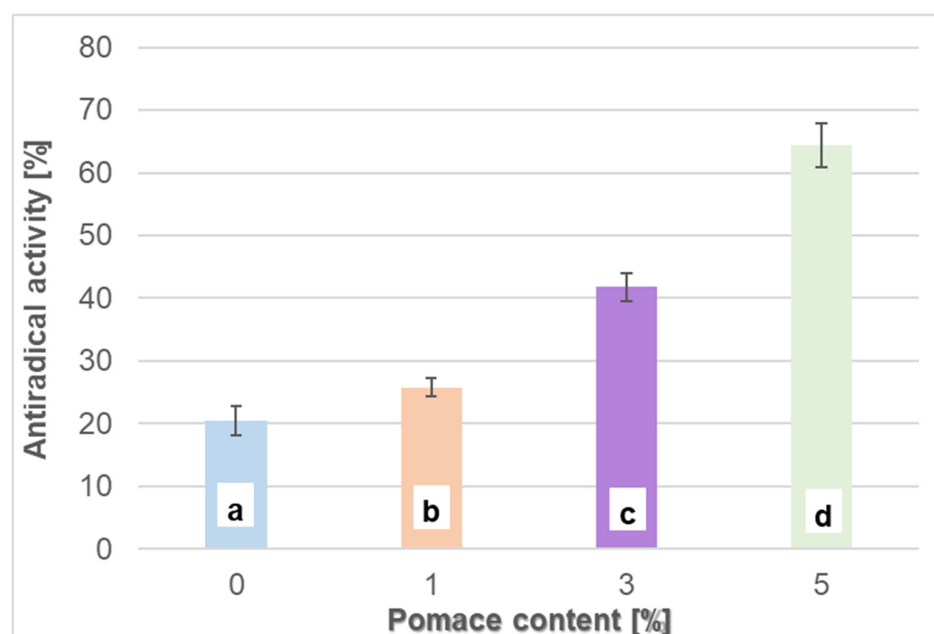
**Figure 3.** The maximum shear force for the individual samples, including statistical deviations and homogeneous groups (the same letters indicate membership of one homogeneous group at  $\alpha = 0.05$ ). a,b,c-homogeneous groups.



**Figure 4.** The penetration force for the individual samples, including statistical deviations and homogeneous groups (the same letters indicate membership of one homogeneous group at  $\alpha = 0.05$ ).

The highest antiradical activity against the synthetic radical DPPH (Figure 5) was noted for the sample of lip balm with 5% addition of grape pomace (64.44%). As the proportion of pomace additions decreased, the antiradical activity also decreased and amounted to 41.77% for 3% addition, 25.75% for 1% addition, and 20.5% for the control sample, respectively. Such a test result is due to the presence of ACNs in lip balms, which are responsible for their colouring. They also have the ability to act as absorbers of

ultraviolet (UV) radiation (a source of sun protection factor (SPF)), free radical scavengers against 2,2-diphenyl-1-picrylhydrazyl (DPPH), and agents that prevent melanin formation by inhibiting tyrosinase. In a study by Westfall et al. [21], lip balm formulations with the addition of ACNs showed increased UV radiation absorption, as compared to the lip balm base, and, similar to the lip balms in the current study, all formulations, including the control sample, exhibited high inhibition of the DPPH free radical. Westfall et al. [21] observed these effects at concentrations of micrograms per milligram similar to or lower than that of kojic acid ( $2.41 \pm 0.06 \mu\text{g}/\text{mg}$ ). This is physiologically significant, as the average lipstick consumption is 24 mg per day [21].



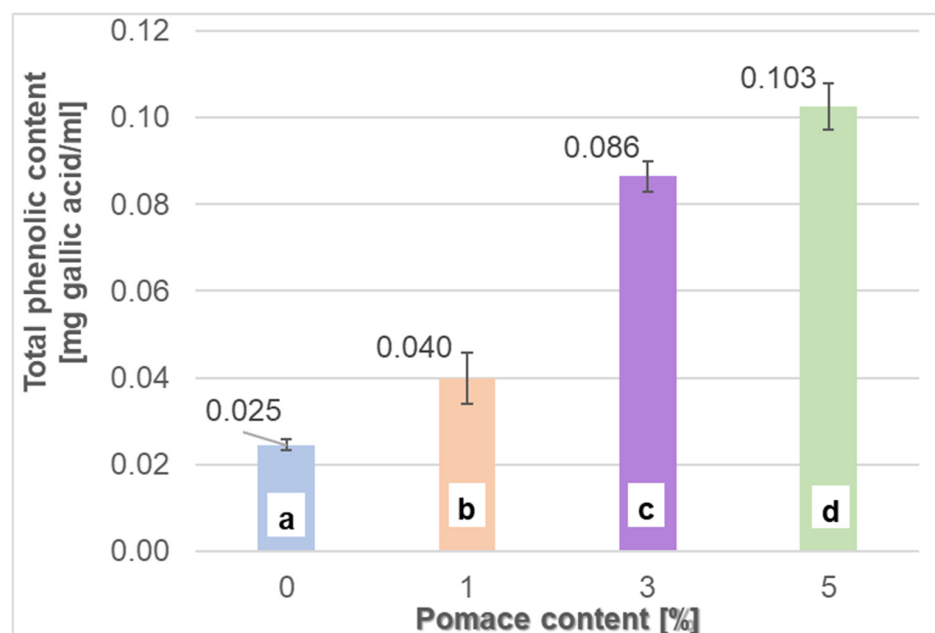
**Figure 5.** The antiradical activity against the synthetic radical DPPH. a,b,c,d-homogeneous groups.

According to Westfall et al., phenolic compounds are among the most thoroughly researched natural antioxidants. They also exhibit antimicrobial, anti-inflammatory, and anti-ageing properties and are capable of penetrating the skin barrier. Grape pomace contains valuable phenolic compounds, and grape by-products are widely available and inexpensive raw materials [21,34].

There is currently a global trend toward developing highly effective chemical sunscreens for protection against UV radiation. As the incidence of skin cancer has increased over the last few decades, naturally occurring compounds have attracted considerable interest because most of them exhibit antioxidant, anti-inflammatory and immunomodulatory properties that provide additional protection against the harmful effects of UV radiation (Westfall et al.). Phenolic acids and flavonoids are effective protective agents due to their ability to reduce oxidative stress, inflammation, and immunosuppression. They can also be important ingredients in cosmetic preparations for skin care after sun exposure. Their topical application effectively inhibits erythema. There is growing interest in plant polyphenols for skin protection against solar radiation, and grapes and grape products, as well as by-products of their processing, are among the natural sources with potential photoprotective properties against UV radiation [21,35].

In the lip balms prepared for this study, the lowest total phenolic content (0.025 mg) was noted for the control sample. The total phenolic content rises with the increase in the pomace content in the sample (0.04 mg; 0.086 mg; 0.103 mg), which clearly shows that

enriching the lip balm formula with grape pomace is a valuable addition that can have a beneficial effect on the delicate skin of the lips (Figure 6).



**Figure 6.** Total phenolic content. a,b,c,d-homogeneous groups.

An analysis of the colour parameters of lip balms with PG additives was conducted (Table 2).

**Table 2.** The change in the colour parameters of lip balms with different additions of PG.

| Addition of PG (%) | L*                         | a*                       | b*                       | ΔE                       |
|--------------------|----------------------------|--------------------------|--------------------------|--------------------------|
| 0                  | 7575.6 ± 1.00 <sup>a</sup> | −1.2 ± 0.17 <sup>a</sup> | 12.9 ± 0.15 <sup>a</sup> | —                        |
| 1                  | 7878.3 ± 0.77 <sup>b</sup> | −1.4 ± 0.14 <sup>b</sup> | 13.4 ± 0.15 <sup>a</sup> | 1.6 ± 0.05 <sup>a</sup>  |
| 3                  | 6666.8 ± 0.87 <sup>c</sup> | 0.2 ± 0.05 <sup>b</sup>  | 9.1 ± 0.09 <sup>b</sup>  | 13.5 ± 0.81 <sup>a</sup> |
| 5                  | 5353.3 ± 1.01 <sup>c</sup> | 1.7 ± 0.02 <sup>b</sup>  | 4.4 ± 0.14 <sup>b</sup>  | 25.5 ± 0.34 <sup>a</sup> |

a,b,c-homogeneous groups in vertical value.

The addition of grape pomace (PG) changed the colour of the balms obtained, causing them to darken and consequently reducing their lightness value. The most significant decrease in lightness (L\*) was noted for the sample with 5% PG addition, whereby the value of this parameter decreased from 75.6 to 53.3. Moreover, as the proportion of PG addition in the lip balm composition increased, the value of colour component a\* increased as well. However, a decrease was noted for colour component b\*. Consequently, the ΔE value increased from 1.6 to 25.5.

In the current study, the lip balm samples did not show a uniform colour, as presented in Figure 1. Studies by other authors show that a non-uniform dark colour may reduce consumer acceptance. For example, Azwanida et al. (2014) used betalains from red dragon fruit (*Hylocereus polyrhizus*) as a natural colourant in lipstick, and their organoleptic evaluation (spreadability, colour) was described as satisfactory, suggesting good visual appeal of the product [35]. It is reasonable to conduct sensory evaluation and potential optimisation actions using a stabiliser in future studies. This may prevent dye migration and increase the durability and uniformity of the product colour [32]. It should be noted that the ACNs found in the fruit of the grapevine are responsible for their red colour. The predominant ACNs found in grape pomace include malvidin-, petunidin-, cyanidin-, peonidin- and

delphinidin-3-*O*-glycosides, with their contents varying considerably depending on the grape variety, maturity, and regional cultivation conditions. It should also be noted that ACNs, among others, play a key role in protecting the skin against free radicals, preventing the oxidation of intercellular cement lipids, and benefiting microcirculation in the skin [36].

#### 4. Conclusions

1. Anthocyanin-containing formulations demonstrated the ability to act as antioxidants by scavenging free radicals in the lip balm matrix. The highest antiradical activity against the DPPH radical (64.44%) was noted for the lip balm with 5% pomace addition. However, as the additive proportion decreased, the antiradical activity of the lip balms also decreased.
2. This study suggests the potential for ACNs to be used as biologically active components in lip balm formulations. The highest phenolic content was noted for the sample with 5% addition of pomace (0.103 mg). The phenolic content decreased with decreasing pomace content.
3. Regarding the assessment of the physical property parameters, the addition of grape pomace to the lip balm formulation resulted in slight decreases in the values of kinetic friction, shear, and penetration forces. However, only in the case of maximum shear force and maximum friction force was the difference between the samples statistically significant, which indicates that the addition of grape pomace can result in lip balm brittleness.
4. Based on the tests conducted, the use of grape pomace as an ingredient in peeling lip balms enables the development of cosmetic products with exfoliating and antioxidant properties while utilising waste products from the food industry, which contributes to reducing the environmental footprint of the cosmetics industry.

**Author Contributions:** Conceptualisation, P.Ł.; methodology, P.Ł.; software, J.M.; validation, P.S.; formal analysis, P.Ł.; investigation, P.Ł., P.K. and M.W.; resources, P.Ł. and M.W.; data curation, P.Ł. and P.K.; writing—original draft preparation, P.Ł.; writing—review and editing, P.Ł. and P.S.; visualisation, P.Ł. and J.M.; supervision, P.S.; project administration, P.S.; funding acquisition, P.S. All authors have read and agreed to the published version of the manuscript.

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#### References

1. Łusiak, P.Ł.; Mazur, J.; Sobczak, P.; Zawislak, K.; Panasiwicz, M. The use of carrot and apple pomace in the production of healthy snack bars. *Agric. Eng.* **2023**, *1*, 289–300. [\[CrossRef\]](#)
2. Kawecka, L.; Galus, S. Fruit pomace—Characteristics and possibilities of recycling. *Technol. Prog. Food Process.* **2021**, *1*, 156–167.
3. Wiza, P.Ł.; Czubak, W.; Kowalczewski, P. Grape marc as an addition to the production of homemade cider. *Inżynieria Żywności* **2018**, *2*, 9–14.
4. Tarko, T.; Duda-Chodak, A.; Bebak, A. Aktywność biologiczna wybranych wyłoków owocowych oraz warzywnych. *Żywność Nauka Technol. Jakość* **2012**, *4*, 55–65.
5. Anderson, O.M.; Jordheim, M. *Basic Anthocyanin Chemistry and Dietary Sources in Anthocyanins in Health and Disease*, 1st ed.; CRC Press: Boca Raton, FL, USA, 2014; pp. 13–90.
6. Giusti, M.M.; Wrolstad, R.E. Acylated anthocyanins from edible sources and their applications in food systems. *Biochem. Eng. J.* **2003**, *14*, 217–225. [\[CrossRef\]](#)

7. Sigurdson, G.T.; Tang, P.; Giusti, M.M. Natural colorants: Food colorants from natural sources. *Annu. Rev. Food Sci. Technol.* **2017**, *8*, 261–280. [\[CrossRef\]](#)
8. Mazza, G.; Kay, C.D.; Holub, B.J. Absorption of Anthocyanins from Blueberries and Serum Antioxidant Status in Human Subjects. *J. Agric. Food Chem.* **2002**, *50*, 7731–7737. [\[CrossRef\]](#)
9. Sánchez-Ortiz, A.; Mateo-Sanz, J.M.; Mateos-Fernandez, M.A.; Figueras, M.L. New Labeling Rules for Wine: Wine Alcohol-Derived Calories and Polyphenol Consumption on Health. *Foods* **2024**, *13*, 295. [\[CrossRef\]](#)
10. Shih, P.-H.; Yeh, C.-T.; Yen, G.-C. Anthocyanins Induce the Activation of Phase II Enzymes through the Antioxidant Response Element Pathway against Oxidative Stress-Induced Apoptosis. *J. Agric. Food Chem.* **2007**, *55*, 9427–9435. [\[CrossRef\]](#)
11. You, J.L.; Yoon, K.Y.; You, Y.K.; Oran, K. Effects of an aqueous extract of purple sweet potato on nonalcoholic fatty liver in high fat/cholesterol-fed mice. *J. Nutr. Health* **2015**, *48*, 1–8.
12. Gee, J.M.; Johnson, I.T. Polyphenolic compounds: Interactions with the gut and implications for human health. *Curr. Med. Chem.* **2001**, *8*, 1245–1255. [\[CrossRef\]](#)
13. Chan, C.F.; Lien, C.Y.; Lai, Y.C.; Huang, C.L.; Liao, W.C. Influence of purple sweet potato extracts on the UV absorption properties of a cosmetic cream. *J. Cosmet. Sci.* **2010**, *61*, 333–341.
14. Bae, J.Y.; Lim, S.S.; Kim, S.J.; Choi, S.-J.; Park, J.; Ju, S.M.; Han, S.J.; Kang, I.-J.; Kang, Y.-H. Bog blueberry anthocyanins alleviate photoaging in ultraviolet-B irradiation-induced human dermal fibroblasts. *Mol. Nutr. Food Res.* **2009**, *53*, 726–738. [\[CrossRef\]](#)
15. Tsoyi, K.; Park, H.B.; Kim, Y.M.; Chung, J.I.; Shin, S.C.; Lee, W.S.; Seo, H.G.; Lee, J.H.; Chang, K.C.; Kim, H.J. Anthocyanins from Black Soybean Seed Coats Inhibit UVB-Induced Inflammatory Cylooxygenase-2 Gene Expression and PGE2 Production through Regulation of the Nuclear Factor-kappaB and Phosphatidylinositol 3-Kinase/Akt Pathway. *J. Agric. Food Chem.* **2008**, *56*, 8969–8974. [\[CrossRef\]](#)
16. Hsu, C.K.; Chou, S.-T.; Huang, P.-J.; Mong, M.-C.; Wang, C.-K.; Hsueh, Y.-P.; Jhan, J.-K. Crude ethanol extracts from grape seeds and peels exhibit anti-tyrosinase activity. *J. Cosmet. Sci.* **2012**, *63*, 225–232.
17. Gonzaga, E.R. Role of UV light in photodamage, skin aging, and skin cancer: Importance of photoprotection. *Am. J. Clin. Dermatol.* **2009**, *20*, 19–24. [\[CrossRef\]](#)
18. Bojanowski, K. Hypodermal delivery of cosmetic actives for improved facial skin morphology and functionality. *J. Cosmet. Sci.* **2013**, *35*, 562–567. [\[CrossRef\]](#)
19. Crisan, M.; Luminata, D.; Moldovan, B.; Vulcu, A.; Dreve, S.; Perde-Schlepler, M.; Tatomir, C.; Filip, A.G.; Bolfa, P.; Achim, M.; et al. New nanomaterials for the improvement of psoriatic lesions. *J. Mater. Chem.* **2013**, *1*, 3152–3158. [\[CrossRef\]](#)
20. Kim, M.J.; Choung, S.Y. Mixture of polyphenols and anthocyanins from *Vaccinium uliginosum* L. alleviates DNCB-induced atopic dermatitis in NC/Nga mice. *Evid.-Based Complement. Altern. Med.* **2012**, *2012*, 461989. [\[CrossRef\]](#)
21. Westfall, A.; Sigurdson, G.T.; Giusti, M.M. Antioxidant, UV Protection, and Antiphotoprotection Properties of Anthocyanin-Pigmented Lipstick Formulations. *J. Cosmet. Sci.* **2019**, *70*, 63–76.
22. Ugale, C. Metamorphosis of domestic waste to an active skincare product. *Natl. Acad. Sci. Lett.* **2022**, *45*, 331–333. [\[CrossRef\]](#)
23. Guo, X.; He, L.; Sun, J.; Ye, H.; Yin, C.; Zhang, W.; Han, H.; Jin, W. Exploring the Potential of Anthocyanins for Repairing Photoaged Skin: A Comprehensive Review. *Foods* **2024**, *13*, 3506. [\[CrossRef\]](#)
24. Richard, C. Lipstick Adhesion Measurement. In *Surface Science and Adhesion in Cosmetics*; Wiley-Scrivener: Centre Val de Loire, France, 2021; pp. 637–641.
25. Tataruch, K.; Kucia, M. Eco-Friendly Waterless Cosmetics. *Manag. Qual.* **2022**, *4*, 204–218.
26. Yu, J.; Ahmedna, M. Functional components of grape pomace: Their composition biological properties and potential applications. *Int. J. Food Sci. Technol.* **2013**, *48*, 221–237. [\[CrossRef\]](#)
27. Mazur, J.; Różyło, R.; Wójcik, M.; Panasiewicz, M.; Zawiślak, K.; Sobczak, P. Development of an Innovative Attachment Determining Friction Parameters for Quality Assessment in Sustainable Processing. *Sustainability* **2022**, *14*, 12986. [\[CrossRef\]](#)
28. ASTM D1894-1. Available online: <https://www.astm.org/standards/d1894.htm> (accessed on 23 April 2025).
29. Brand-Williams, W.; Cuvelier, M.E.; Berset, C. Use of Free Radical Method to Evaluate Antioxidant Activity. *Food Sci. Technol.* **1995**, *28*, 25–30. [\[CrossRef\]](#)
30. Singleton, V.L.; Orthofer, R.; Lamuela-Raventos, R.M. Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin-Ciocalteu reagent. *Methods Enzymol.* **1974**, *299*, 152–178.
31. Rafferty, D.W.; Dupin, L.; Zellia, J.; Giovannitti-Jensen, A. Predicting lipstick sensory properties with laboratory tests. *Int. J. Cosmet. Sci.* **2018**, *40*, 451–460. [\[CrossRef\]](#)
32. Łusiak, P.; Różyło, R.; Mazur, J.; Sobczak, P.; Matwijczuk, A. Evaluation of physical parameters and spectral characterization of the quality of soaps containing by-products from the food industry. *Sci. Rep.* **2024**, *14*, 4687.
33. Esposito, C.L.; Kirilov, P. Preparation, Characterization and Evaluation of Organogel-Based Lipstick Formulations: Application in Cosmetics. *Gels* **2021**, *7*, 97. [\[CrossRef\]](#)
34. Soto, M.L.; Falque, E.; Dominguez, H. Relevance of Natural Phenolics from Grape and Derivative Products in the Formulation of Cosmetics. *Cosmetics* **2015**, *2*, 259–276. [\[CrossRef\]](#)

35. Azwanida, N.N.; Normasarah, A.A. Utilization and Evaluation of Betalain Pigment from Red Dragon Fruit (*Hylocereus Polyrhizus*) as a Natural Colorant for Lipstick. *J. Teknol. (Sci. Eng.)* **2014**, *69*, 139–142. [[CrossRef](#)]
36. Oborska, A. Kosmetyczne zastosowanie winorośli. *Chem. Rev.* **2015**, *9–10*, 18–20.

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